20 visionaries. 10 years. 1 future.

From Bowie to Gates to Berners-Lee, we asked what computing will look like in The Next Decade. **Supplement follows page 40**

COMPUTERWORLD

The World's Technology Newspaper
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January 4, 1999 • Vol. 33 • No. 1 • $4/Copy

NT virus threat targets networks

▸ *Unix systems can become unwitting carriers*

By Sharon Machlis

A NEW CLASS OF VIRUS that exploits Windows NT networking capabilities appeared last month at MCI WorldCom Inc., prompting warnings that other such attacks are likely to follow.

"This is radically new. It is targeting the basic network itself," said Peter Watkins, general manager at Network Associates Inc., the Santa Clara, Calif.-based antivirus software vendor that worked with MCI to clean up the infection.

Once inside a company, the Remote Explorer virus looks across a network for processes running with administrator privileges. When it finds a susceptible target, it steals administrator privileges, installs itself and infects executable files.

"It's a very sophisticated programming technique," Watkins said. Remote Explorer also en-

NT virus, page 12

IT MANAGEMENT

Knowledge 'czars' fall from grace

By Barb Cole-Gomolski

TWO YEARS AGO, a lot of companies thought that appointing a knowledge management czar — a chief knowledge officer — was the best way to harness corporate know-how.

In reality, the favored strategy has been to take a much more grassroots approach, in which a team of knowledge management experts works closely with — or even is part of — the business units.

CKOs were supposed to straddle business and information technology. Their mandate was to convince workers that it's good to share information and work with IT to build applications to support such sharing. But companies found that putting more control of knowledge management in the hands of end users made it an easier sell.

According to a report from The Delphi Group Inc., a research firm in Boston, about half the companies in the U.S. have some kind of knowledge management effort under way.

Delphi recently completed a study of 25 companies that have knowledge management groups in place and found that the bulk

Knowledge, page 12

GREG STEVENSON/THREE IN A BOX

SNAPSHOTS OF 1998

It was a roller-coaster year of megamergers, manic-depressive Internet stocks and near-panic over the millennium bug. The news in 1998 was full of conflict, too, as the U.S. government and Microsoft clashed in the courtroom over just how aggressive a high-tech capitalist can be. Only one thing is certain: There will be more of the same this year.

- **The Top 10 IT Stories of 1998. News, pages 14-15**
- **We revisit some of the IT leaders profiled in 1998. Managing, page 99**
- **Look for 1999 to be the year you put Linux to the test, a revolution happens in handhelds and everyone waits for Windows 2000. Review Center, page 105**

☞ When they planned a trip to **Nicaragua** after **Hurricane Mitch**, IT workers from Ronin Corp. expected to **set up a database** to help families locate lost loved ones. But they found medical workers with more basic demands. **"What we really need is to be able to communicate,"** said one medical director in Managua. So the team set out to help them do just that.

See story, page 4

MARY BETH WELCH

Workers at Hospital Antonio Lenin Fonseca

Users call in Oracle SWAT team

By Craig Stedman

EARLY USERS ARE starting to go live with a bundle of applications for consumer packaged goods companies that Oracle Corp. released in early 1997.

But Oracle had to set up a development SWAT team several months ago to grease the skids after a group of users told company officials they needed extra help to complete their rollouts before the year 2000 deadline.

And some users are still looking for the Oracle CPG software to be tied together more cohesively, a wait that won't end soon. Oracle said an upgrade that will add common application programming interfaces for linking the half-dozen products in the bundle isn't due out until mid-2000.

That's a switch from earlier promises of a 1999 release for

Users, page 10

NEWSPAPER

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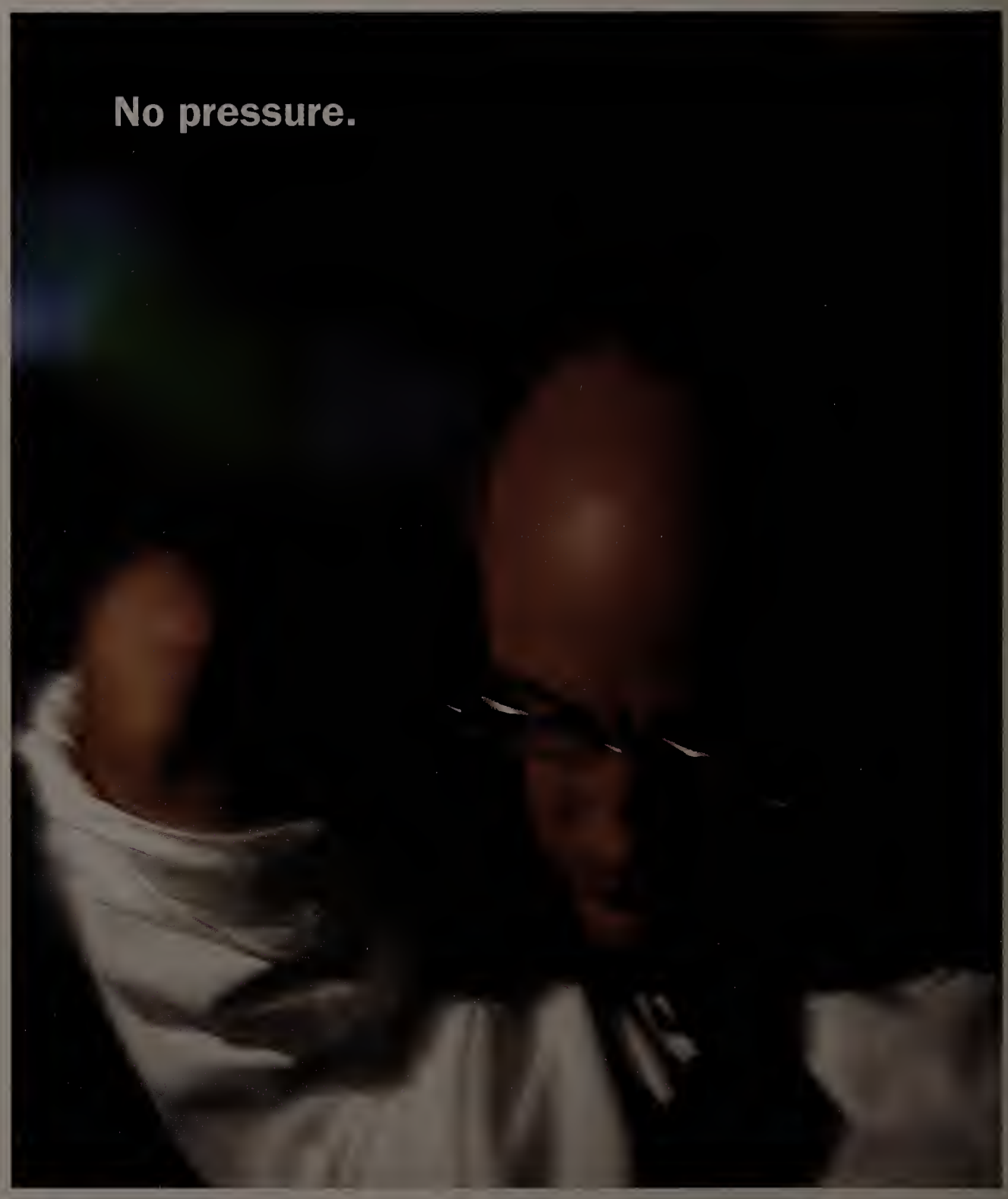

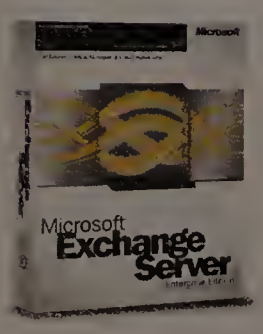

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PG&E CIO John Keast predicts declining demand for IT jobs as Y2K projects wrap up. **Jobs Forecast '99, page 110**

Renting DVDs online was a natural business model for NetFlix, says Jim Cook. **Internet Commerce, page 29**

MovieFone collects reams of customer data that could help theaters plan screenings. **Corporate Strategies, page 21**

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YEAR 2000

Y2K legal traps lie in wait, so CIOs must prepare for when they're sprung, Paul Strassmann warns. **101**

Michael Cohn dreams that year 2000 may be no big deal.But he's just kidding. **109**

Executive Briefing

News summary for senior managers

■ What happens to the CIOs profiled in *Computerworld*? All kinds of things. Remember the married CIOs? One got international responsibilities, the other became a high-priced consultant. GM's CIO is still looking for more progress but already has saved $400 million, launched car-buying Web projects, consolidated design and started to revamp the supply chain. And GE CEO Jack Welch is shuffling his top IT staffers, who head up GE's $450 million-per-year quality program. Page 99

■ The IRS is revamping the way it handles IT, relying on a consortium of private-sector firms to pull together a coherent plan. The 15-year contract addresses an IT weakness often cited by the General Accounting Office, but the length of the deal and competition among vendors are both risks, critics say. Page 4

■ Software makers have won several year 2000 cases recently, but legal experts say the victories don't set a precedent in favor of the vendors. Most such cases still end in settlements. Page 6

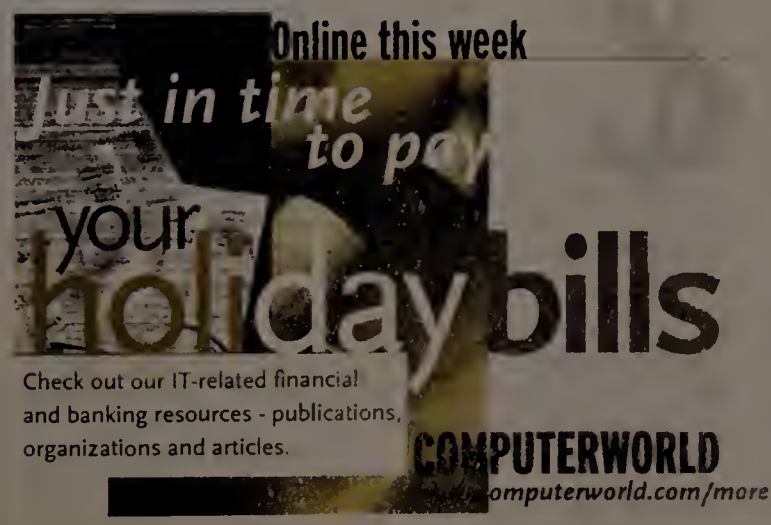
■ Hurricane Mitch killed an estimated 11,000 people in Central America and shattered roads and telecommunications networks, leaving hundreds of thousands isolated. *Computerworld*'s Mary Beth Welch accompanied three IT staffers from Ronin Corp. on a mission to install servers and other communications gear in Nicaragua to help the country's medical facilities coordinate rescue and health care operations. Page 4

■ Legal traps are set up around the year 2000 issue, Paul Strassmann warns. Lawyers are preparing for cases involving product liability, corporate officer liability, fraud and misrepresentation of year 2000 readiness — and myriad other approaches. IT managers will be the ones who pay. Page 101

■ CIOs and *Computerworld*'s annual hiring survey agree it will get easier to hire qualified technical people this year, although good ones can still command high salaries. Two-thirds of hiring managers say the labor crunch will delay projects, but that's down from the 80% who said that a year ago. Money and quality-of-life concessions are the best way to hang on to top techs. Page 110

■ Motts North America installed an R/3 system, but when it slowed down, IT couldn't find the bottlenecks. Third-party tools identified the problems and helped Motts optimize performance. One problem was that performance simulations before the rollout didn't take all the real-world problems into account. Page 93

■ Drilling for oil and gas is so risky that huge companies team up to fund explorations. A project designed to exploit natural gas reserves in the North Atlantic uses middleware and an extranet to make up-to-date information available anywhere to consortium members. Page 21



NEWS

IT rescuers help build crucial E-mail links

▸ *Enabling medical info exchange in Nicaragua*

Editor's note: In November, Hurricane Mitch killed an estimated 11,000 people in Central America. More were left homeless, cut off from food and medical aid. Computerworld's *Mary Beth Welch accompanied three information technology workers from Princeton, N.J.-based Ronin Corp. to improve communications at three Nicaraguan hospitals.*

By Mary Beth Welch

IT WAS FRIDAY, NOV. 13 — six days after Hurricane Mitch ravaged Nicaragua — when we toured Managua, the capital, and four other cities and quickly learned that medical facilities desperately needed to share information about the crisis.

The Ronin team's idea was to set up a database to track storm survivors [CW, Nov. 16]. But once in Nicaragua, the group worked on a plan to set up network servers among three hospitals, including one in Managua. The goal: to let health care workers at the hospitals and local clinics trade information via E-mail about disease control and medical supplies.

GIFT OF HOPE

The team members plan to revisit the hospitals in February to finish implementing the project. But they already have delivered hope, said Dr. Petro A. Sequeira, director of a clinic in Leon, Nicaragua. His son, Peter Sequeira, is a Ronin help desk administrator on the team.

"Just seeing people volunteering to help has given [medical workers] something to look forward to. Especially for remote areas where they depend on [paper] to be delivered before anything can be done," Dr. Sequeira said.

At Hospital Antonin Lenin Fonseca in Managua, paper piles dominate. Dr. Jose Noel Somarriba Aguero, director general at the hospital, said he has two PCs, including one with an Internet link.

The hospital's records room was crammed with stacks of manila folders stuffed with patient records — as much as the room could hold.

"What we really need is to be able to communicate — share data and medical records with other hospitals and clinics within the country," Somarriba said.

PRECIOUS POWER

Cheap, reliable communications would have helped a remote city such as El Salsa (population 15,000), about a three-hour drive over dirt roads from Managua. During Hurricane Mitch, El Salsa lost electricity — and no power means no refrigeration for needed medical supplies.

On Nov. 19, the Ronin team traveled in a Jeep through rivers where bridges and roads were destroyed to install a generator that will prevent blood and other supplies from spoiling — and support a PC with Internet access.

The team from Ronin, a technology market research firm, includes Sequeira, Andy Garcia and CIO Bob McCracken. Their plan calls for installing Windows NT 4.0 servers at three hospitals to support message routing and remote access by PC users. They also are using a disease-tracking program provided by the Atlanta-based Centers for Disease Control and Prevention.

"Keeping people communicating and connected in a natural disaster is the most useful skill we have," McCracken said.

MARY BETH WELCH

By easing communication among hospitals, members of the Ronin team helped hasten the delivery of medical supplies to devastated towns such as Posoltega, Nicaragua

During the trip, team members traveled to Chinendega's Hospital Espania, where they connected Dr. Luis Callajas' PC to E-mail.

He was scheduled to be linked to Dr. Sequeira in Leon so the two doctors could communicate about patients' medical cases. □

MICROSOFT MICROSCOPE

- The U.S. Department of Justice wants **Microsoft Corp.** executive **James Allchin** to answer questions – which the government claims he ducked in an earlier deposition – about tests the company ran on software that removes the functionality of Internet Explorer from Windows 98. The government filed a motion Dec. 21 in the antitrust case seeking further testimony from Allchin, senior vice president of personal and business systems. **Edward Felten,** a Princeton University professor and a witness for the government, developed the browser removal program. In his Sept. 29 deposition, Allchin said he couldn't comment on Felten's program because Microsoft's testing of it wasn't complete. Microsoft claims that its browser is an integrated part of Windows and says Felten's program only hid the browser's functionality. The government has accused Microsoft of illegally tying the browser to the operating system. The trial is set to resume Jan. 4.
- Microsoft asked the judge in the Java case for up to two extra months to make its Java products comply with **Sun Microsystems Inc.**'s specifications. U.S. District Court **Judge Ronald Whyte** had ordered Microsoft to do the work by mid-February. Microsoft also asked the judge to clarify whether any "independently developed" Java-based products must comply 100% with Sun's rules for the programming language. Microsoft asked that the motion for more time be decided by Jan. 8.
- Online greeting-card maker **Blue Mountain Arts** won a round in a recent suit against Microsoft. A judge ordered Microsoft to immediately help Blue Mountain recode its greeting cards so that Microsoft's Outlook Express E-mail program stops treating the cards as spam and shunting them to a "junk mail" folder instead of users' regular in-boxes. **Hartford House Ltd.,** Blue Mountain's parent company in Boulder, Colo., sued Microsoft in December, saying the rerouting feature could hurt Blue Mountain's business. Outlook Express also treats Microsoft's own online greeting cards as spam. – Kim S. Nash and Patrick Thibodeau

Private sector to tackle IRS mess

By Patrick Thibodeau
WASHINGTON

THE INTERNAL REVENUE SERVICE turned to the private sector in December to help reverse a string of failures in its IT modernization program. But in so doing, the IRS may face its biggest challenge yet: managing an outsourcing contract that may be the largest ever signed.

The IRS approved a 15-year contract with a consortium of seven information technology vendors, led by Computer Sciences Corp. (CSC). The IRS isn't providing estimates of the ultimate value of the contract, but some analysts said it may be as high as $8 billion.

The pact represents a major change in the IRS's beleaguered IT modernization effort. Instead of using contractors to bid piecemeal on IT projects, the IRS is putting the burden on the consortium to develop architectures and strategies for replacing its 30-year-old systems.

The IRS has spent about $4 billion during the past 12 years to modernize its information systems. But the effort has drawn stinging criticism from Congress and the U.S. General Accounting Office (GAO) for a host of costly mistakes and administrative problems, such as abandoning its $1.4 billion Document Processing System after spending $300 million and misplacing 6,400 magnetic tapes that may have contained taxpayer information.

STRING OF FAILURES

The GAO has issued dozens of reports detailing the IRS's problems, and it plans to study the contract with CSC. "The IRS has failed both ways," said Rona B. Stillman, the GAO's chief computer and telecommunication scientist. "They have failed in trying to build [systems] themselves, and they have failed in contracting."

The latest effort has its challenges and pitfalls, users and analysts said. "There's a huge contract management job still in front of the IRS," said Henry Philcox, a former CIO at the IRS. "Having the expertise to manage the prime vendor is the challenge the IRS now faces."

Some see management land mines in the agreement. The consortium companies can bid against one another for work, and that may lead to problems, warned Patrick McBride, an analyst at Meta Group Inc. in Stamford, Conn. "The last thing you want is potentially warring vendors looking for the next big thing they get."

The length of the contract also has raised eyebrows. But Edward Zier (zier@uschamber.com), vice president of operations at the U.S. Chamber of Commerce in Washington, said there are benefits to a long contract. "You know that there is going to be a consistent basis for management of those services over time," he said.

The chamber in 1997 signed a 10-year, $75 million outsourcing deal with Cap Gemini America in New York. □

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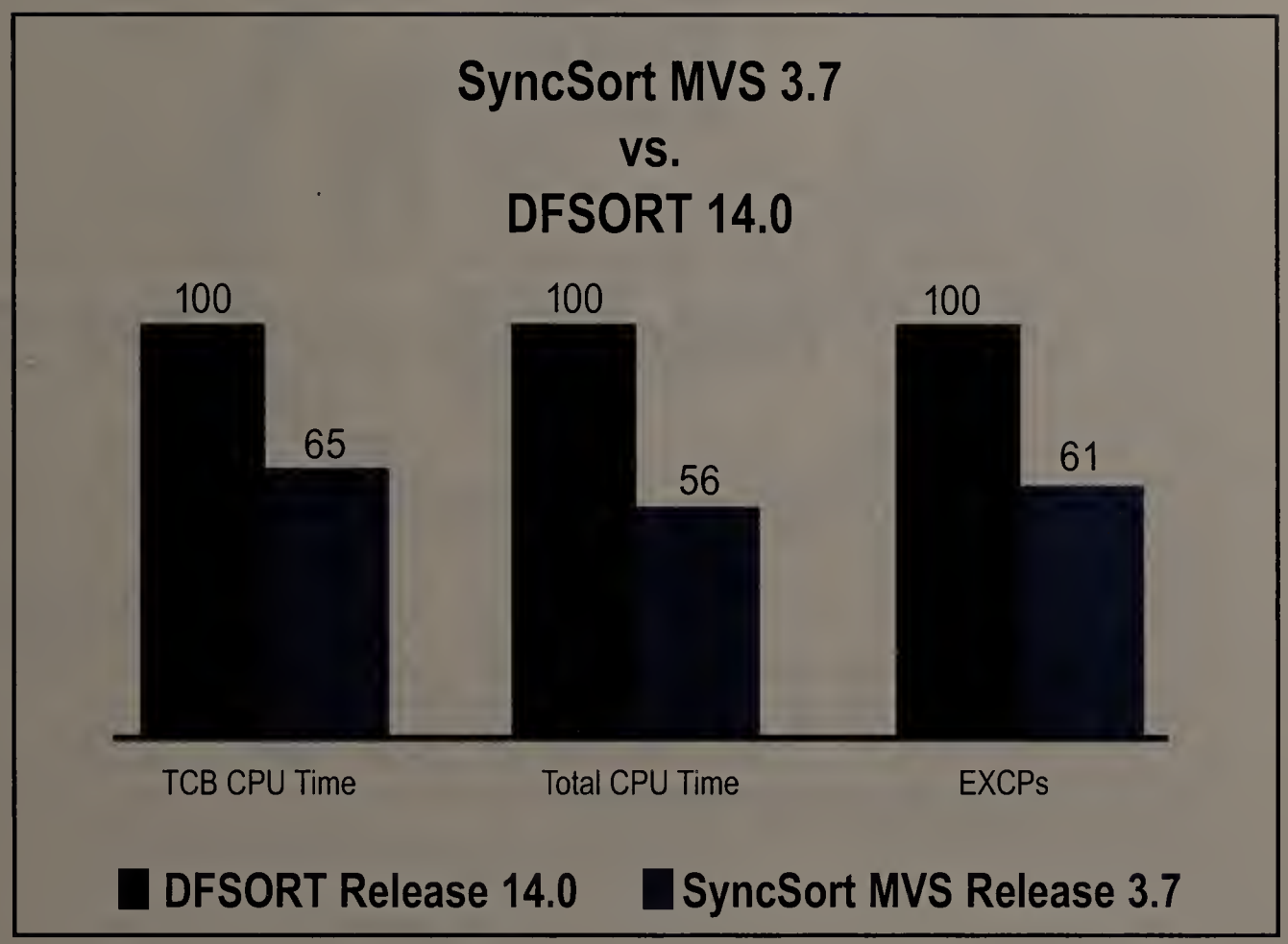

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Sun's JavaBeans plan stretches to 2001

By Carol Sliwa

SUN MICROSYSTEMS INC. last month laid out an Enterprise JavaBeans (EJB) road map that stretches in three phases to beyond 2000.

Corporate developers who would rather wait for stable Java technology said they don't expect the timetable to hamper their development projects. But some may give pause before moving to the eagerly awaited component technology that can cut the amount of server-side Java code they need to write.

"It's got me a little concerned," said David Kulakowski, manager of mainframe technology at AlliedSignal Inc.'s aerospace equipment systems division in South Bend, Ind. "It's almost as if you wouldn't want to be starting into this until it's a little more firmed up."

The Enterprise JavaBeans 1.0 specification emerged in March. But so far, there has been no reference implementation to prove that the spec works and help vendors ensure their products' compatibility.

"Until there's a reference implementation, EJB is likely to [have] interoperability problems," said David Smith, an analyst at Stamford, Conn.-based Gartner Group Inc.

According to Bill Roth, enterprise Java product line manager at Sun, the EJB road map's first phase calls for a spec by the end of June and a final reference implementation by year's end (see chart).

"You can count on this [time line] slipping big-time because each phase is going to run into its own technological and political issues," predicted Tim Sloane, an analyst at Boston-based Aberdeen Group Inc. "Despite the obvious shortcomings, there are work-arounds that can be put in place today that enable Java to be used in the enterprise."

Electric Boat Corp., for instance, has been developing to the EJB spec. The Groton, Conn., submarine maker had to deal with security holes in the EJB spec, but it expects to deploy the code soon with IBM's EJB-compliant WebSphere application server, said Tom Rando, a principal investigator at Electric Boat.

Many other companies, however, are inclined to wait for more solid technology.

"I'd rather have a more robust product than have to make a lot of changes and patches on the back end, because they're a lot more expensive there [than on the front end]," said John Melka, senior manager of information technology tools at NationsBanc Services Inc. in Chicago. □

Sun's Enterprise JavaBeans spec road map

PHASE ONE

To make security information portable from system to system using Extensible Markup Language. To refine the server-side transaction model to ensure that enterprise data is transmitted intact. Due Q2 1999.

PHASE TWO

To provide a Connector API, or standard method for any EJB server to connect to back-end systems such as transaction processors and enterprise resource planning systems. Due Q1 2000, with reference implementation due 3 to 6 months later.

PHASE THREE

To define entity beans, components that automatically map an application's Java code into database and server operations. Due Q4 2000, with reference implementation due 3 to 6 months later.

Source: Bill Roth, Enterprise Java product line manager, Sun Microsystems Inc.

Vendors win early Y2K disputes

By Thomas Hoffman and Craig Stedman

SEVERAL VENDORS, including Andersen Consulting and Macola Software Inc., have chalked up decisive victories in resolving year 2000 disputes.

But legal experts said the victories don't necessarily signal a trend toward pro-vendor decisions in determining year 2000 liability. The rulings were made in lower courts — not at the appellate level, where they would be binding upon other courts.

"These cases are not setting precedents," said Dean Morehous, co-chairman of the year 2000 legal practice at Thelen, Marrin, Johnson & Bridges, a San Francisco law firm.

MILLENNIUM LIABILITY

For example, a county court judge in Marion, Ohio, dismissed a suit last month that involved breach of warranty and fraud charges against Macola, a maker of Windows-based financial and manufacturing applications for small companies.

The suit, filed by a New York law firm, sought free upgrades or reimbursements of upgrade fees for users of an older version of Macola's software that isn't year 2000-compliant. But the judge ruled that the plaintiffs failed to prove that Macola had breached the terms of its software license agreement.

Many of the early year 2000 lawsuits have ended with settlements. Medical Manager Corp., a Mountain View, Calif., maker of financial and administrative software for doctors, agreed in December to settle six of eight year 2000 suits filed against it in various states. The deal requires Medical Manager to pay $1.455 million into a settlement fund for customers who already bought a year 2000 upgrade.

But also last month, J. Baker Inc., a Canton, Mass.-based apparel retailer, dropped plans to file suit against Andersen Consulting after a Massachusetts mediator concluded that the Chicago-based consultancy had met all its contractual obligations.

J. Baker hired Andersen Consulting in 1989 to customize and install a merchandise management system it had bought from a software vendor that has since gone out of business.

But the contract didn't require the system to be year 2000-ready. In fact, J. Baker had signed off on a section of the contract that revealed that there would be two-digit date fields in the software program, according to an Andersen Consulting spokesman.

A spokesman for J. Baker acknowledged that the contract didn't address year 2000 issues, so the retailer decided against litigation. J. Baker has since made year 2000 fixes. □

Processor to give more laptop power management

By Matt Hamblen

CORPORATE USERS desire many things from the next generation of laptops, including upgradable features and lower prices, but oft-mentioned on their wish lists for 1999 models is longer battery life.

An anticipated chip from Intel Corp., code-named Geyserville, will let notebooks run in two power and performance modes to spare battery life, analysts said. It's expected to appear late in 1999. Although Apple Computer Inc. began offering a similar feature several years ago for its Macintosh notebooks, the technology is new to PCs.

With the new chip, road warriors who need notebooks only for word processing and E-mail access could sap less power from a battery than when the same machines are docked and plugged in to a power outlet. The laptop could operate as a PC to process a complicated spreadsheet or an engineering drawing quickly, said Ken Dulaney, an analyst at Gartner Group Inc. in Stamford, Conn.

The chip would let users "finally be able to have their cake and eat it, too," said J. Gerry Purdy, an analyst at Mobile Insights Inc. in Mountain View, Calif.

"Being able to better manage my power might give me an extra hour when I need it," said Chris Behning, vice president of MIS at General American Corp., a mortgage information provider in Pittsburgh. But Jim Ranager, senior systems administrator at the State Fire Academy of Mississippi, said he would want to test any power-management chip before using it in the field.

"A power-management chip would not be as important to me as a longer-life battery," Ranager said.

Batteries are expected to get longer life but not substantially more in 1999, analysts said.

Also, airlines are lessening the need for long battery life by adding power plugs for computers on planes. For example, US Airways Group Inc. began offering plug-in power at all seats in all classes in November aboard new Airbus A319 planes being added to its fleet. United Air Lines Inc. has power at business and first-class seats aboard certain aircraft. Delta Air Lines Inc. and American Airlines expect to have laptop power at business and first-class seats within three to four years, analysts said. □

Intel readies laptop, server chips

By April Jacobs

INTEL CORP. is expected to announce a barrage of processors by April, including a first-time Celeron-based, low-end laptop chip and high-end server chips based on 450-MHz Pentium II Xeon processors.

Intel spokesman Seth Walker confirmed that the chips would be out by April but provided no release dates.

The Santa Clara, Calif., chip maker is expected tomorrow to announce new 450-MHz Pentium II Xeon processors for servers with three caching options. The new Xeons will have a choice of 512K, 1M and 2M bytes of cache, vs. the standard 512K bytes of the current Xeon. A larger cache can speed applications such as compiling code and sorting databases.

The new Xeons are a shoo-in in the financial world, where transaction processing and heavy data processing eat up as much power as servers can provide, said Brian Brumit, a director at PricewaterhouseCoopers, an accounting and consulting firm in New York.

A successor to the Pentium II, code-named Katmai, also is due by April, Walker confirmed. It will have enhanced graphics performance and speeds of 400 and 450 MHz.

Separately, expected on Jan. 7 are new mobile PC processors based on 266-MHz Celeron chips. Intel also will offer up a new 300-MHz mobile MMX Pentium chip. Those mobile offerings will address the low-end market. □

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FRANKLY SPEAKING

'99 do's and don'ts

FRANK HAYES

READY FOR 1999? What was supposed to be a heads-down, grind-away-at-Y2K year is shaping up instead as a wild 12 months for IT — with the outside world making plenty of waves inside the IT shop. Here are a few do's and don'ts to help you make it through the year.

DO expect Y2K to dominate everything this year — from your own Y2K efforts to a stream of Y2K lawsuits against every hardware and software vendor. But don't expect to gain much from those suits — except maybe a raft of free Y2K software patches offered by vendors hoping to stave off legal threats.

DON'T be surprised if Windows 2000 shows up in 1999. Corporate Windows NT users want the new features, and Microsoft will want to field-test Win 2K before requiring its licensees to preload it on consumer PCs.

DO watch out for business partners that unexpectedly install enterprise software packages from SAP, Baan and PeopleSoft. Emergency installations of those big packages may serve as a (relatively) quick fix for Y2K problems. It beats going out of business. But to get those packages working fast, a company may have to radically change its business processes — and that could affect how your systems communicate with them.

Do plan to see Asian economies start their comebacks this year.

DO budget for ever-cheaper PC hardware — and ever-more-expensive people, especially IT workers with hot skills. Yes, 1999 *should* be the year of hardware upgrades and lots of training to retain good people, but it probably won't be, not until that Y2K project's done.

DON'T expect IT age discrimination to ease off in the next year, either. There will be plenty of work to go around in 1999, but IT workers will increasingly be pigeonholed by age. The birthday cake will hit the fan next year as workers battle over who will get to stay once Y2K projects start winding down.

DO look into new approaches to creating IT systems. Once we're past all those Y2K fixes, the order of the day will be tight user focus, fast payback — and planned obsolescence.

DON'T let "open source" software blindside you. If you allow your developers to modify the source code, be prepared to throw away the whole mess and start over if your programmers aren't extraordinarily disciplined — and compulsive about documenting their changes.

DO plan to see Asian economies start their comebacks this year. That may mean extra work for IT if expansion plans or partnerships for your company were put on hold because of international financial problems.

DON'T bet on smart cards or cybercurrency to be widely used for electronic commerce, at least in the U.S. For now, credit cards still rule.

DO watch for a continued slow unwinding of U.S. encryption restrictions — with the emphasis on *slow*. It won't make the free-crypto-for-everybody crowd happy, but easing crypto restrictions should make life easier for companies wanting to do electronic business internationally.

DON'T bet on Steve Jobs accepting a permanent job at Apple. (A year ago, people thought I was crazy to make that prediction; now it looks like Jobs will be interim CEO forever.) And don't bet on the Apple IMac to displace PCs on corporate desktops. But within a few years, something will displace those PCs — and most likely it will look a lot like a PalmPilot.

DO prepare personally for Y2K zero hour. What's the worst natural catastrophe — hurricane, killer blizzard, flood, earthquake, tornado — that could leave you without electricity, water and phone service for days at a time? If you're prepared for that, you'll likely survive the worst that Jan. 1, 2000, will throw at you. □

Hayes is Computerworld's staff columnist. His Internet address is frank_hayes@cw.com.

SHORTS

Clinton makes Y2K assurance

Even as President Clinton last week announced that the year 2000 issue has been solved for the Social Security Administration (SSA), some observers were warning it was too early for the federal government to make such an assessment, in part because it uses other computers outside the agency to administer some programs, critics said. However, the SSA has been credited with launching the most aggressive federal effort to fix its year 2000 problems, whereas other agencies, such as Energy, Defense and the IRS, have been heavily criticized for not doing enough, soon enough.

Report details Y2K readiness

Cap Gemini America LLC will today release a report on year 2000 preparedness, based on a survey of 110 Fortune 500 companies and 12 government agencies. The survey has good news and bad news. Holding steady, 74% of those surveyed expected to have more than half of their systems tested and compliant by Jan. 1, 1999. The percentage of companies with a process in place to test code has risen from 16% last quarter to 62%, and 100% of respondents are developing contingency plans compared with only 3% in April.

Driving those plans may be the bad news. According to the survey, 55% of the largest U.S. companies have already experienced a year 2000-related failure — mostly in terms of processing disruptions or financial miscalculations. That figure has been steadily rising all year in Cap Gemini surveys. Nearly all respondents — 98% — expect more such failures this year. Another 92% said missed deadlines are occurring with greater frequency, while 84% said their cost estimates for fixing the problem were "too low." Also key, the number of companies likely to stop doing business with noncompliant business partners jumped to 69%, up from 60% in the third quarter.

Stella Goulet, a year 2000 analyst at CAP Gemini, said the results aren't surprising. "As companies get further into the issue, they look at how complex the problem is and reduce their estimates for how much [work] they'll have done by the end of the year." Companies need to "focus on an all-out effort in Y2K testing" in 1999, she said, as indicated by the number of year 2000 milestones that are slipping.

TCP/IP security flaw

The Computer Emergency Response Team (CERT) issued a warning that certain TCP/IP connections are vulnerable to hackers' attacks. Intruders would be able to disrupt service or crash systems once the faulty connection was discovered, the CERT warning said, and remote users also could suffer from system crashes and stalled service. Unix vendors Berkeley Software Design Inc. and FreeBSD Inc. discovered some vulnerable areas and issued security fixes, according to CERT.

Security disablers barred

A federal judge has issued a preliminary injunction that bars the distribution of products that disable software antipiracy protection. Lawyers at Brown Raysman Millstein Felder & Steiner LLP, representing CNC Software Inc., said they won the injunction against Pro Solutions Inc. in St. Augustine, Fla., and its Imagine That Icelock and Rivalock software.

Social Security miscalculation

A U.S. Treasury Department Social Security trust fund has been erroneously credited with $1.4 billion in interest since 1980 because of a computer program that wasn't updated to take market changes into account. The error also affected other government trust funds, including ones related to Medicare and retirement savings for federal employees. The government will use new calculations for future investments.

Real-time Java factions to meet

Aonix Corp., a Java tools vendor based in San Diego, will host January's monthly meeting of the real-time Java working group that's been developing a list of requirements for a specification. Following the Jan. 12-13 meeting, a Hewlett-Packard Co.-led splinter group that's been working on a spec for a real-time extension to Java will meet Jan. 14-15.

Virus disrupts insurer

A computer virus brought down about 1,000 of State Farm Insurance Co.'s 105,000 computers nationwide on Dec. 23. Officials said a Microsoft Corp. Word macro virus affected PCs at regional claims offices and could infect the home computers of people who contact the Bloomington, Ill.-based insurer through the Internet or E-mail.

SHORT TAKES **Sunburst Hospitality Corp.**, which owns 87 hotels, signed a five-year, $2.4 million outsourcing agreement with U.S. Internetworking Inc. in Annapolis, Md., to get new PeopleSoft Inc. financial applications over the Internet by April. . . . **SAP AG** disclosed an investment in **SpeechWorks International Inc.** to aid new SAP customer management software. . . . **The New York Stock Exchange** is planning to invest $350 million in technology and trading-floor systems as part of a preliminary agreement to keep the exchange in New York City. . . . **Korean Air Lines** has signed a 10-year, $129 million outsourcing contract with IBM Global Services.

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Users call in Oracle team

CONTINUED FROM PAGE 1

Version 3.0 of Oracle CPG, which combines Oracle's financial and process manufacturing software with applications for managing orders, assets and supply chains developed by other vendors.

Oracle said it put a higher priority on new inventory- and order-management features that should be ready in the spring (see chart). But it also is devoting some of its CPG developers to the rollout SWAT team, which is helping early users with configuration issues and fast-turnaround bug fixes.

The J. M. Smucker Co. in Orrville, Ohio, maker of jams, jellies and other food products, turned on much of Oracle CPG at the start of December, kicking off a corporatewide installation that will continue well into 2000.

Dick Jirsa, vice president of information services at J. M. Smucker, said the company expects to reap annual savings of $10 million once Oracle CPG is in place at all six of its product divisions. And he added that the project, which is budgeted to cost more than $30 million, is on schedule.

But the phased nature of the rollout is partly the result of the amount of work needed to connect Oracle CPG to the mainframe systems that J. M. Smucker uses now, Jirsa said. "We're reaching the milestones we wanted to reach," Jirsa said. "It's just a lot of work." And until Version 3.0 ships with the promised integration improvements, he added, Oracle CPG "is not a finished product."

Development road map for Oracle's CPG application bundle

Version 2.4

Due: Next spring

Key features: New functionality for vendor-managed inventory and order promising

Version 3.0

Due: Summer of 2000

Key features: Hub-and-spoke integration layer and common application programming interfaces

Oracle and the other vendors that supply software for the bundle currently have to go deep into the internals of the applications and integrate them on a one-to-one basis. The same goes for J. M. Smucker and other users that are tying Oracle CPG to existing systems, said Jeff Wexler, a senior product management director at Oracle.

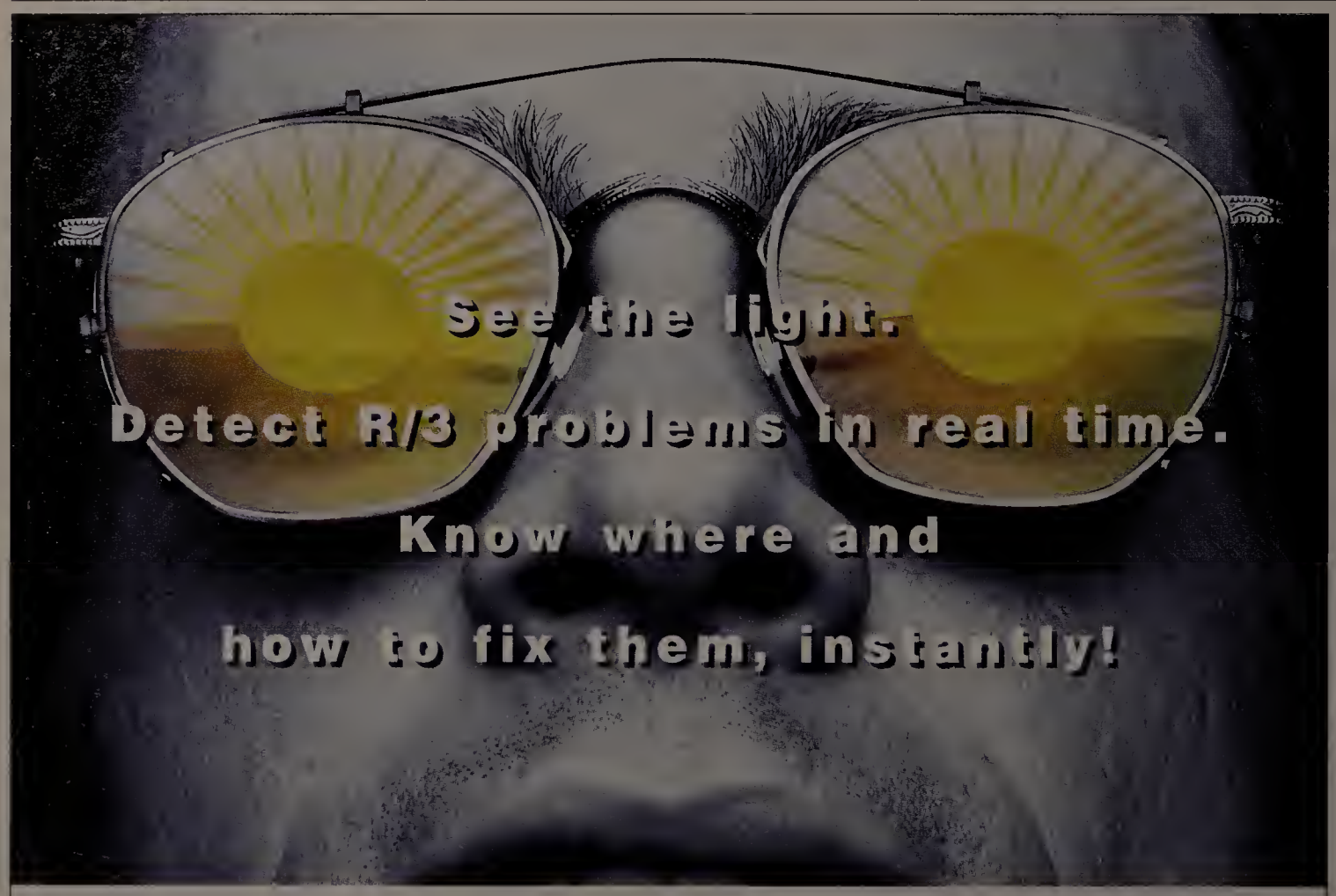
Version 3.0 will replace the one-to-one links with an integration hub that Oracle CPG and user applications can hook in to via simplified APIs, Wexler said.

The initial release of Oracle CPG in early 1997 "way preceded the development of it as a physical package" of tightly integrated software, said David Caruso, an analyst at AMR Research Inc. in Boston. And users have been struggling to get off the ground with the bundle, Caruso added.

Oracle put together its SWAT team after users on a customer advisory council said they needed "an all-out push" to go live with Oracle CPG before the year 2000 bell tolls, Wexler said. At least nine companies, including cereal maker Kellogg Co. in Battle Creek, Mich., have started using various pieces of the package since early fall, he added.

Tri Valley Growers, a San Ramon, Calif., farming cooperative that grows and cans tomatoes and other fruits, has installed several of the Oracle CPG packages. But the applications aren't being used in an integrated way yet, said Jim Davis, the cooperative's project manager.

And a full rollout of Oracle CPG is on hold because the cooperative's management reversed a decision to change the way it processes orders to fit the package, Davis said. He added that getting the software modified would cost about $1 million — a bill Tri Valley Growers isn't sure it wants to foot. □



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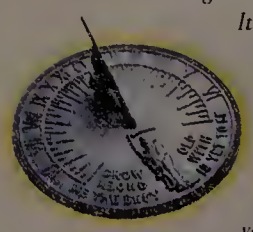

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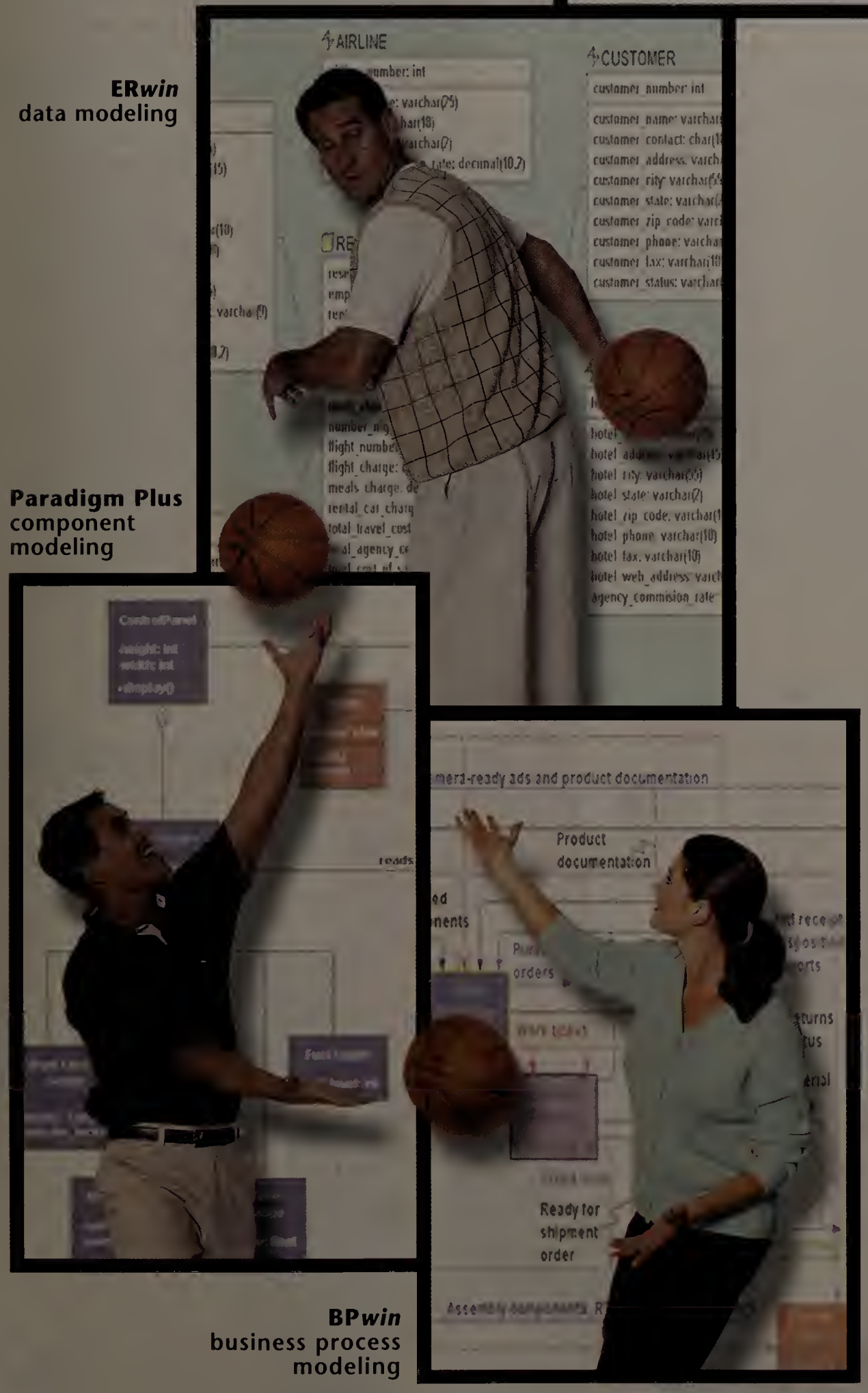

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Real-time chat seeks business role

By Roberta Fusaro

VENDORS ARE forging ahead with real-time chat initiatives, even though some users are indifferent to the technology.

David Sheehan, vice president of information systems at Atlas Copco Wagnor Mining in Portland, Ore., makers of underground mining equipment, said he is "underwhelmed" by the use of instant messaging technology in business. "I can't see how we'd use it. Regular E-mail is instantaneous enough," he said.

But user hesitancy hasn't stopped the following initiatives:

- At Lotusphere '99 this month, Lotus Development Corp. will launch its revamped Notes 5.0 E-mail client bundled with its Sametime family of real-time communication products. The Sametime products are in public beta testing and were slated to ship with Notes 5.0 by year's end. Pricing hasn't been set.

The software features one-click access and "buddy lists" — similar to America Online Inc.'s Instant Messenger software — and may be used alone or with Lotus Notes and Domino 4.6 and higher.

- More than 30 vendors, including Lotus and Microsoft Corp., are working on a standard that will let different chat clients communicate. They formed an Instant Messaging and Presence Protocol working group at last month's Internet Engineering Task Force meeting.
- AT&T WorldNet Service last month said it will offer an instant messaging service for its 1.3 million subscribers. The technology is based on PowWow chat software from Tribal Voice in Scotts Valley, Calif.
- StarMedia Network last month said it will launch a bilingual instant messaging client called StarMedia Express that supports characters for Spanish and Portuguese. □

NT virus threat targets networks

CONTINUED FROM PAGE 1

crypts random text and hypertext files, making the files unusable. The virus file is named IE403R.SYS.

"It's new because this is the first [exploitation] of NT's trust mechanism," said Adam Shostack, directory of technology at Netect Inc., a security software company. "It will likely not be the last."

Although Unix systems aren't damaged by the virus, they can become "carriers" and help spread the virus elsewhere. Other Windows operating systems can host infected files but won't become a base for further contamination, according to Network Associates.

How the Remote Explorer virus works

- "Steals" NT domain administrator security privileges
- Checks across network for processes running with administrator privileges
- Installs itself in NT Driver directory as IE403R.SYS and also uses an associated dynamic link library
- Infects and compresses program files, randomly encrypts text and HTML files
- Stays memory-resident, requiring infected systems to be shut down
- Includes a timer to be most active during evenings and weekends, when administrators are less likely to be on duty

Source: Network Associates Inc., Santa Clara, Calif.

WEB-SITE INFO

Network Associates has posted information about the virus, detection and cleaning of files on its Web site *(www.nai.com)*. Other vendors are also working on detection and cures as well as offering advice on how to prevent the virus from spreading.

An MCI spokesman said the virus was detected and contained relatively quickly, with no impact on customers or external operations.

The virus used its own encryption algorithm, which Network Associates experts were able to decode, allowing the recovery of damaged files.

In a statement, Microsoft Corp. stressed that the virus "does not exploit any security vulnerabilities in the Windows

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NT operating system" and noted that normal security precautions can reduce the threat of infection.

REAL WORLD

"It's an interesting examination of how security works in the real world," Shostack said. Microsoft urges users to log on as an administrator only when necessary.

However, Shostack said that's often inconvenient because users have to close down all their processes and log in again each time they want to switch.

With Unix, administrators can run multiple windows, only one of which has higher privileges. The command that allows that, though, has itself become a vulnerability exploited by hackers in the past.

Shostack said last month's small outbreak is no cause for panic. But Larry Dietz, security analyst at Current Analysis Inc. in Sterling, Va., said hackers using such viruses are likely to seek "high-payoff" targets with large networks. "If you're a Fortune 500 company, you should be concerned," he said. □

Knowledge 'czars' fall from grace

CONTINUED FROM PAGE 1

of knowledge sharing happens within business units. "So having a CKO sends out the wrong message," said Delphi President Tom Koulopoulos.

Instead, Koulopoulos said, he sees many companies creating a team that helps each business unit understand the benefits of sharing knowledge. Spreading the responsibility for knowledge management also combats the cultural barriers involved in getting people to share information, he said.

"It's too difficult to start [knowledge management] at the enterprise level," said Jan Scites, vice president for Internet implementation strategy at AT&T Corp. in Bedminster, N.J. The company began its knowledge management efforts in its customer care department and has since rolled out similar applications. "I don't think we'll ever have a CKO," Scites said.

Similarly, The Mutual Group, an insurance holding company in Waterloo, Ontario, has a vice president who oversees the knowledge management team, two knowledge architects and more than 20 team members from IT and the business units.

This organization works because "there is a tendency for the [knowledge management] effort to lose momentum when we get into the trenches," said Betsy Lewis-Chan (*betsy.lewischan@themutualgroup.com*), a Mutual Group knowledge architect.

It's not so much that people don't want to share information, though there is some of that, she said. The resistance comes from the fact that "people are already so busy," she said. Sharing knowledge may mean changing the way they work or adding an extra step to the process to enter some data into a corporate repository or publish it to a Web site.

Because workers are already strapped for time, the knowledge management team at Mutual Group sells them on the idea that the knowledge management effort will save them time. "It may mean that they can spend less time looking for information or read fewer E-mails, but the benefit is efficiency," Lewis-Chan said.

Participants in the Delphi study also said that, for many companies, knowledge management positions were seen as an interim step designed to bring knowledge management to critical mass — essentially a statement of corporate priorities.

Sharon Oriel, director of intellectual asset management at Dow Chemical Co. in Midland, Mich., said that over time, knowledge management will become part of the corporate culture. "It's kind of like safety was years ago," Oriel said. "It used to be that you had a safety person in every department, but now safety is expected and is a condition of employment." □

Knowledge management gains momentum

Base: 500 IT professionals at large U.S. companies

Source: The Delphi Group Inc., Boston

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The Top 10 IT Stories of 1998

Microsoft antitrust trial grabs IT spotlight

U.S. vs. Microsoft.

1 October saw the start of the historic Microsoft Corp. antitrust trial, a battle that will rage on — what with the expected appeals and appeals of appeals — until the middle of 2000, legal experts say.

Both sides have the weapons needed to endure: teams of lawyers, lots of money and a tenacious belief that they are in the right.

The Department of Justice accuses Microsoft of abusing its monopoly power in PC operating systems to squeeze business partners into unfavorable contracts and to squash rivals such as Netscape Communications Corp.

THE ASSOCIATED PRESS

William Neukom, Microsoft's top lawyer, is using the "everybody does it" defense

Economists, computer experts and executives from Microsoft competitors — IBM, Sun Microsystems Inc. and Netscape, to name a few — have testified so far.

Microsoft, although it won't make its case in court until mid-January, has said it doesn't have monopoly power because, in part, there's no narrow market for PC operating systems.

Overall, Microsoft's defense is, in essence: "We've done nothing wrong, and anyway, everyone else is doing it."

Although the case hasn't provided many answers yet — they won't come until the judge's decision — testimony has raised basic questions that affect us all. What's a product? What's a feature? What's an operating system?

The trial for which Judge Thomas Penfield Jackson originally cleared two months has now lasted almost three. It isn't expected to wrap up until late February at the earliest.

Said one antitrust professor tracking the case, "So much for Jackson's optimism."

Y2K becomes a mainstream concern.

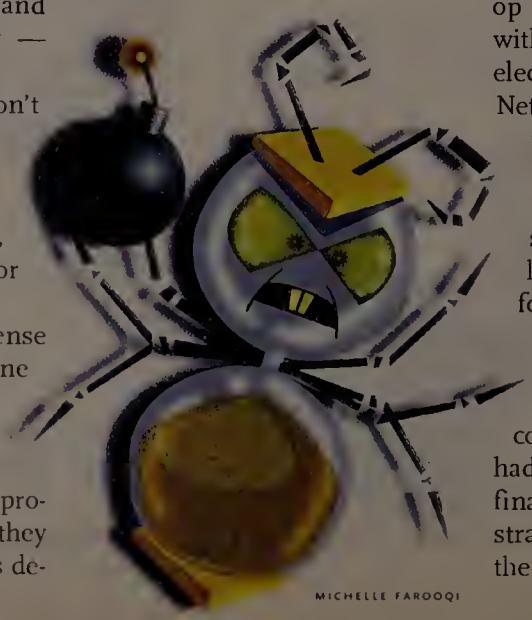
2 In 1998, the year 2000 problem emerged from techno-obscurity to become headline-grabbing news in *USA Today* and the subject of congressional hearings. Even *60 Minutes* ran a segment that included a programmer/survivalist who has set up a mountain hideaway with its own sources of power and water in anticipation of widespread outages and rioting.

Word began to spread that it wasn't just a mainframe problem. Issues began to sprout with PCs and embedded chips in process controls, elevators, pacemakers and other date-sensitive devices.

The Securities and Exchange Commission forced public companies to disclose their project costs in quarterly financial statements. General Motors Corp. and The Chase Manhattan Bank Corp., for example, predicted that they will spend $250 million or more to fix the problem. Regulators even punished a handful of banks and brokerages that failed to comply with their requirements.

President Clinton got into the act by establishing a White House council on the year 2000. He also signed a bill limiting liability for sharing information about the millennium bug, although critics said it was too little, too late.

And the clock keeps ticking.



MICHELLE FAROOQI

AOL buys Netscape.

3 Consumer-oriented America Online Inc.'s $4.2 billion stock deal for Netscape raised more than a few questions among corporate users about the future of Netscape's business-oriented software.

A side deal with Sun softened the November bombshell to a degree. Sun pledged to license, market, advertise and co-develop AOL/Netscape software — with particular emphasis on electronic commerce. But Netscape's appeal in the corporate market has rested on its business software's ability to run on multiple operating systems. Sun, quite naturally, favors its own Solaris platform.

On one hand, the deep pockets of AOL and Sun may soothe the fears of any corporate customers who have had concerns about Netscape's financial stability and shifting strategies. On the other hand, the direction of Netscape's and Sun's products — particularly those lines in which they compete— remains an unresolved issue.

STEVEN BORNS

AOL's Steve Case teamed up with Sun and Netscape to battle Microsoft

The IT labor crunch.

4 Just two weeks into 1998, the Information Technology Association of America unleashed a report that put the number of IT job vacancies at 346,000. By March, critics were poking holes in the report, saying the trade group had greatly overstated the problem.

Either way, the lack of skilled IT workers was a common complaint among IT managers in 1998. "There are clearly job vacancies out there," said Howard Rubin, chairman of the computer science department at Hunter College in New York. "But that doesn't mean there aren't enough people."

Still, fresh college graduates holding degrees in computer science commanded, on average, more than $40,000 per year to start, and companies struggled to hold on to existing talent with cash bonuses and other perks.

Meanwhile, high-tech companies pressured Congress to increase the number of visas granted to highly skilled foreign workers to fill some of those job vacancies.

The Internet matures as a media, shopping and stock-trading channel.

5 No, not everyone has forsaken the local mall for Web shopping or dropped NBC for MSNBC.com. But the rise of the Net was nevertheless dramatic.

Web demographics broadened. Women are now almost as likely as men to be online. Electronic retailing emerged everywhere, with expensive TV ads airing and Web addresses plastered everywhere, from catalogs to billboards. Forrester Research Inc. in Cambridge, Mass., predicted that Web stores would ring up $3.5 billion in online sales by the close of '98.

Almost every major real-world retailer with a serious Web presence says the Internet

THE ASSOCIATED PRESS

When Kenneth Starr released his report, the nation crowded onto the Web for details

1998 milestones

Births: Windows 98; Apple's IMac.

Anniversaries: The mouse turned 30. The laser turned 40. The transistor turned 50.

Deaths: Internet pioneer Jon Postel; the Apple Newton; *Byte* magazine.

Glitches: AT&T's frame-relay network was disrupted for almost 24 hours in April. Millions of pagers were knocked out by a wayward satellite in May. Hong Kong's new airport had computer snafus in July.

Other milestones

- The Federal Trade Commision filed antitrust charges against Intel in June.
- Computer Sciences Corp. fended off a hostile takeover attempt by Computer Associates International.
- Multinational companies geared up for Europe's single currency, the euro.

The Top 10 IT Stories of 1998

is now the fastest-growing piece of its business.

Online trading also soared: Charles Schwab & Co. alone has more than 2 million active Web

accounts, with $145 billion in assets.

And when Kenneth Starr's report was released, the nation first crowded onto the Web for details — no longer willing to wait for the next day's newspaper. That day, Sept. 11, remains the busiest ever for CNN's Web site, with 34 million page views served up.

"We consider the medium more and more mass, more and more part of daily life," said Mary Ann Packo, president of Media Metrix Inc. in New York, which measures consumer habits on the Net.

Windows NT 5.0: More delays and a new name.

6 Microsoft's decision to rename Windows NT as Windows 2000 had some corporate users figuring they will have to wait even longer for the final release of the much-delayed operating system.

Because Windows 95 shipped in 1995, and Windows 98 shipped in 1998, some industry watchers said they find it hard to believe Windows 2000 will arrive in 1999, as Microsoft executives have insisted.

But no matter. Analysts say that even when Windows 2000 does ship in various pieces, most organizations are likely to wait a year to actually implement it.

PC prices continue to plunge.

7 PC makers broke below the $1,000 price barrier in the midst of outright sales warfare.

And while the sub-$1,000 PC didn't become anything close to a staple in corporations, companies found they could take advantage of lower prices and a cutthroat market to forge better deals with top makers such as Compaq Computer Corp., Dell Computer Corp. and IBM.

So, will we soon see a $499 PC in corporate America?

No, said Steve Kleynhans, an analyst at Stamford, Conn.-based Meta Group Inc. He predicted that manufacturing costs will eventually put a halt to the price plunge.

Congress enacts Internet policies.

8 Before turning to impeachment, the U.S. Congress gave considerable attention to legislation affecting the Internet. It passed the Internet Tax Freedom Act, creating up to a three-year moratorium on new Internet taxes. The tax measure establishes an Advisory Commission on Electronic Commerce with a mandate to report back to Congress in two years on how to address the thorny issue of state and local taxation of electronic commerce.

Congress also passed the Children's Online Privacy Protection Act.

Compaq buys Digital Equipment Corp.

9 Digital's 41-year history of independence came to an end after PC maker Compaq stunned the industry with a $9.6 billion bid for the venerable midrange systems vendor last January.

THE ASSOCIATED PRESS

Digital's 41-year history of independence ended with Compaq's January purchase

Compaq's goal was to enter the big leagues of the computer industry, exploit Digital's IT services business and reach deeper into corporate accounts.

Now it's working to reassure Digital customers that it won't abandon technologies such as OpenVMS, Digital Unix and the Alpha processor line.

The Microsoft/Sun fight over Java.

10 Sun sued Microsoft for alleged contract breaches related to Java in late 1997, and users began to feel the impact in 1998.

The whole thing started because Microsoft modified Java to make it run better on its Windows operating system, thus undermining the cross-platform appeal of the programming language.

In March, the judge presiding over the lawsuit forced Microsoft to strip the official Java logo from its products. In November, he ordered Microsoft to comply with Sun's specifications while the parties waited for a 1999 trial.

That was a big blow to Microsoft for two reasons: It means the software giant must rewrite parts of its Java products — the stand-alone developer tools and the versions of Java that come with Windows and its Internet Explorer browser. That must be done by mid-February, U.S. District Court Judge Ronald Whyte said.

More important, however, Whyte's ruling also suggested that Sun is likely to prevail in the Java case as a whole.

Whyte's rulings so far probably won't affect developers much anyway, said Ron Rappaport, an analyst at Zona Research Inc. in Redwood City, Calif.

"The reality is, if you're using Microsoft's version of Java, you've already decided which environment you're going to work in — Windows," Rappaport said.

At press time, Microsoft had asked Whyte for an extra two months for product compliance and to clarify whether Microsoft could ship "independently developed" Java-based products that didn't meet Sun's specifications. □

Computerworld staff members Barb Cole-Gomolski, Matt Hamblen, Thomas Hoffman, April Jacobs, Sharon Machlis, Kim S. Nash and Carol Sliwa contributed to this report.

The megamergers of 1998

ACQUIRING COMPANY	TARGET	VALUE OF DEAL (In billions of dollars)
Exxon	Mobil	$81
SBC Communications	Ameritech	62
Bell Atlantic	GTE	52
British Petroleum	Amoco	48
WorldCom	MCI Communications	47
NationsBank	BankAmerica	43
Daimler-Benz	Chrysler	42
Travelers Group	Citicorp	37
Norwest	Wells Fargo	32
AT&T	TCI	32

Source: Press reports

Internet stocks: Some fly, some don't

COMPANY STOCK	JAN. 2, 1998, CLOSE*	DEC. 21, 1998, CLOSE
Amazon.com	59 1/2	318 3/4
EBay	47 3/8 (Sept. 19)	296 3/8
Yahoo	66 1/4	247 1/4
GeoCities	37 3/4 (Aug. 10)	39 15/16
EarthWeb	67 (Nov. 12)	42 1/2
Ticketmaster/CitySearch	43 1/16 (Dec. 4)	45 9/16
TheGlobe.com	40 7/16 (Nov. 17)	36 1/2

*Dates are for IPOs

THE ASSOCIATED PRESS

Sun Microsystems CEO Scott McNealy locked horns with Microsoft over the future of Java

OPINION

Leap (of faith) year

I try to be as upbeat as possible as I look forward into each New Year. But it's hard to feel much optimism for the industry's 1999 outlook. After two years of rapid, exhilarating change, I expect we're due for a breather.

The major cause, of course, is you-know-what. In 51 Saturdays, we will know if the year 2000 problem is a catastrophe, an overhyped boondoggle or something in between. No matter what the outcome, this will be a year of great anxiety and posterior-covering in corporate IT. And as a result of *millennia nervosa*, a lot of other decisions will be put on hold.

The biggest one may be the migration to Windows 2000. The new operating system is supposed to be the big technology event of 1999. But frankly, I'm dubious that it will even ship this year. And it really doesn't matter whether it does or not. In a year 2000-crazed corporate information technology world, few big systems upgrades will be undertaken, anyway. Think about it: Do you want to be the CIO who has to tell the boss that your systems failed because you were busy upgrading Windows instead of testing your applications?

Then there's the Internet. As Webmania enters year No. 4, consolidation is inevitable. Amazon.com has a great franchise, but the company isn't worth four times as much as Borders and Barnes & Noble combined. The inevitable decline in Internet stocks will send investors scrambling for the exits — and with them, the capital that funds new ideas. The big will get bigger, and many of the small will go away.

Consolidation is boring. It gives lawyers and accountants dominion over technologists and depresses innovation. On the upside, it also stabilizes markets and creates new platforms for growth.

Finally, there's one prediction for 1999 I can make with great assurance. It will be a time of big changes at *Computerworld*. Look next week for the debut of a more streamlined, easier-to-navigate newspaper that groups our stories into news, business and technology categories. We look forward to hearing from you about our new design, so don't be shy. In the meantime, Happy New Year to all!

Paul Gillin, *editor in chief*
Internet: *paul_gillin@cw.com*

LETTERS

Sorry, guys: Java is more than a language

FRANK HAYES is dead wrong ["Kicking the Java habit," CW, Nov. 23]. And regardless of what he says, it's pretty obvious that Bill Gates knows it.

He may have said that "Java is just a language," but I believe he also was quoted as saying, "Java scares the hell out of me."

If Microsoft prevailed in the recent court decision, that might have been true. Visual J++ was designed in just that philosophy. But Java is not just a language. It is a language supported by a standardized set of classes, providing the closest thing yet to the software Holy Grail of reusable code.

Java is a standard, right up to the level of the windowing system itself.

For productive real-world GUI programming, you need to buy in to a heavyweight proprietary package like the Microsoft Foundation Classes.

Java, on the other hand, is a standard, right up to the level of the windowing system itself. While AWT may hardly be "heavy duty," at least it's the first step in that direction. If I made my living selling proprietary windowing operating systems, I'd be scared too. Not even Smalltalk offered this level of consistency.

"Write once, run anywhere" has proven an elusive goal, at least so far. But perhaps more important is its benefit in training: Learn once, use anywhere.

Tim Holloway
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His verdict? Government lawyers can't be trusted

GALEN GRUMAN'S column ["Bill Gates and the end of innocence," CW, Nov. 30] reveals mainly his naïveté regarding modern American jurisprudence. A government prosecutor may pursue a high-profile case to further his personal ambitions or inflate his own ego, at least as much as he might from a genuine belief that any law has been violated. It's little wonder that a recent survey found that 73% of law partners and 57% of judges believe the government cannot be trusted to "do the right thing."

Government lawyers can commence an action based on slightly more than a scintilla of evidence of wrongdoing. They (ab)use the discovery process to gain tactical advantage by distracting employees and senior management from running the business, harassing the company's vendors and suppliers, and forcing the company to incur significant legal expenses.

Our society's landscape is strewn with lives broken and businesses destroyed by publicity-hungry prosecutors who are permitted to make messes but have no responsibility for cleaning them up, even though their victims ultimately are completely vindicated.

David C. Fischer
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Skilled project management can put tools to good use

I CAN ONLY ASSUME that Mr. Keen ["Let's put project management out of its misery," CW, Dec. 7] has never worked on a project with an experienced project manager. Any skillful project manager can tell you that integration is one of the key factors in a project's success.

In addition to integration, another primary responsibility of the project manager is to obtain commitment, coordination and relationships among stakeholders. Although I agree that tools, particularly the up-and-coming Web-based tools, can assist in integrating projects, there are no magic bullets. Without a project manager's skills, no tool by itself can make a project successful.

Let's not get rid of project management, but let's make sure we have skilled project people managing projects using a good methodology. In the end, IS will deliver projects on time and within budget while meeting stakeholder expectations.

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Computerworld welcomes comments from its readers. Letters shouldn't exceed 200 words and should be addressed to Maryfran Johnson, Executive Editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.

Doomsday 2000: What's your personal strategy?

John Gantz

New Year's Eve 1999 is less than a year away. The newspapers already are reporting that there's likely to be a champagne shortage — stock up now or you'll be drinking Asti Spumante — and hotel rooms in Times Square are booked.

In a recent *Prairie Home Companion*, the folksy variety show from fictional Lake Wobegon, Minn., storyteller Garrison Keillor had one of his characters building a year 2000 fallout shelter. Last weekend, I found out that a friend of mine, at the urging of his programmer son-in-law, bought a generator of industrial strength to handle year 2000 power outages.

Sheesh. And all I was thinking of doing was taking a few weeks' worth of cash out of the ATM sometime in August or September to keep around in case there's a run on the banks that last week.

You know the doomsday scenario, don't you? While most of the office systems we deal with — stock exchanges, bank computers, manufacturing systems — will be year 2000-compliant, lots of embedded systems won't. It's not that there are date fields in the microprocessors that throw switches remotely in the electrical grid, control valves in heating and water systems or manage traffic lights, but that their maintenance logs will read that it's been 100 years since anyone serviced the switch/servo/rotor/valve/motor/engine/fan. To be safe, the systems will shut down, creating power outages, chaos in distribution, looting and anarchy.

Any chance you get, blame year 2000 on the greedy corporate managers of the '60s and '70s.

Personally, I'm not worried about year 2000. (Of course, the dinosaurs weren't worried about asteroids hitting the Earth, either.) All I know is that, in more and more social settings, I find average citizens expressing views on what once was primarily an IT professional's domain.

This, folks, isn't good. The IT profession will be front and center for the entire year of 1999 in a way it never has been before. Every kind of nut, charlatan and headline seeker — myself included — will be making pronouncements about our previously obscure profession.

If a million VCRs and microwave ovens start blinking at midnight Dec. 31, if a run on the banks causes a financial crisis in Zurich or if civilization *does* collapse, programmers and systems analysts will be blamed. If Jan. 1, 2000, comes and goes without incident, we will be blamed as alarmists, and our bosses will wonder whether we needed to spend those billions we're now spending fixing this so-called problem.

As the year goes on, we each are personally going to be called on more and more to be year 2000 gurus for our friends and colleagues. For that we'll need to develop our own personal strategy for dealing with year 2000 and for communicating our recommendations. Here are mine:

One. Any chance you get, blame year 2000 on the greedy corporate managers of the 1960s and 1970s who made IT professionals cut corners. Preserve the image of the profession.

Two. Tell half your friends that everyone is overestimating the impact of year 2000 and the other half that everyone is underestimating it. You still will have some friends left on New Year's Day.

Three. Take a week's cash out of the bank in September, but tell people it's for bribing cab drivers at Comdex.

Four. Put in early for vacation the last two weeks of December.

Five. When you bought this year's champagne, I hope you bought next year's, too. □

Gantz is a senior vice president at International Data Corp., a sister company to Computerworld *in Framingham, Mass. His E-mail address is jgantz@idcresearch.com.*

1999: The year of living in the Y2K spotlight

Allan E. Alter

Time magazine named "The Computer" its 1982 Man of the Year. For 1999, I think it will be "The Computer Professional."

In past years, our machines have outshone us. Not this new year. The spotlight will seek us out as we work overtime to keep the electronic brains of the Information Age from dying of millennium meningitis.

And what a strange, warped spotlight it will be:

- Hollywood will portray us as hapless hacks or heroic saviors in the sure-to-come year 2000 catastrophe films.
- Lawyers will scrutinize our every word and move as they get ready to spring their lawsuits.
- Statesmen, politicians, civil servants and relief workers will call us into hearings and meetings to get our learned opinions on the year 2000 problem's scope and dangers.
- Reporters, both Pulitzer Prize winners and tabloid hacks, will stick their microphones in front of our schnozzes and ask us, "Just how bad will it be?"
- Some of us will get special scrutiny: the military, utilities (especially electric companies, but also gas, water and sewer), banks, airlines and key federal agencies such as the Federal Aviation Administration and Internal Revenue Service.
- Our neighbors, family and friends will run to us for advice. I bet you spent part of your Thanksgiving and Christmas dinners fielding questions from nervous parents, children and relatives. I did.

As we get closer to the date, the spotlight will shine hotter. When systems seize up and fail, when pessimists grow more pessimistic, when Wall Street suffers a bad day next December, we who are fixing the problem will get the kind of attention usually reserved for the Mark McGwires and Monica Lewinskys.

I don't know if we're going to be the heroes or goats of 1999. But I do know that if we want to be heroes, the IT profession must rise to the occasion. We must accept our inevitable public role. What the world wants from us is level-headed, trustworthy guidance in a scary time. We have to deliver it. No, that isn't quite right. We have to excel at it.

I would like to see prominent associations of IT executives and year 2000 project managers — such as the Society for Information Management, the Conference Board, the Information Management Forum and the Research Board — speak out on what needs to be done and what we can stop worrying about. Most of them have research arms; members should kick in the money needed so they can track year 2000 progress.

If those groups won't do it, then year 2000 project managers should form an ad hoc task force and do it.

What the world wants from IT leaders is level-headed, trustworthy guidance in a scary time.

Year 2000 chieftains at industry-leading companies such as Wal-Mart Stores, Procter & Gamble and General Motors ought to speak out on their industry's year 2000 preparations, cajoling, warning or praising and reassuring, as called for. They can have an enormous influence on their suppliers and customers.

They should follow the lead of the National Retail Federation, which deserves credit for investigating year 2000 issues that affect retailers and publicizing their findings.

And, as *Computerworld* columnists Ed Yourdon and Peter G. W. Keen have written, we can help our own communities get ready.

I'm not saying you should become a publicity seeker. I'm saying publicity is going to seek you out. Like it or not, this is our year in the spotlight. We can shrivel under its glare like a bug under a magnifying lens or we can show what the people in this admirable profession can do. □

Alter is Computerworld*'s department editor, Managing. His E-mail address is allan_alter@computerworld.com.*

HP's world-class enterprise servers can provide the strong foundation your company needs. With a steadfast 99.95% availability program and unmatched scalability, HP's servers offer the essential

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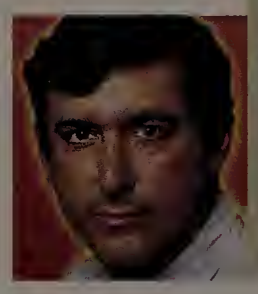
Get ready to let your vendors do the dirty work

David Moschella

They were only minor press events, but Microsoft Corp.'s cooperation with Qwest Communications International Inc. and Yahoo Inc.'s use of Motorola Inc.'s Starfish technology are representative of a trend that began in 1998 but will grow ever-more powerful in 1999 and beyond.

In case you missed the actual announcements, Microsoft and Qwest will work together to use the latter's high-speed communications network to deliver business applications and online software support. Yahoo will use Starfish's data synchronization technology on its Web site to help us co-6ordinate calendar and other information across PCs, laptops and PDAs.



SAP, for example, will have to make R/3 work. Now that's a revolution.

You don't have to get excited about either initiative to see that they are symbolic of a larger trend. Increasingly, both new and established companies are trying to use the Web to replace packaged software with online services, a trend I call the "serveware revolution." (That's "serve" as in services and "ware" as in software.)

The idea is simple. Instead of selling a packaged software product, a vendor develops the software for its Web site, where it is available to any customer with an Internet connection. The vendor then takes care of all upgrades and maintenance.

Of course, this trend is inseparable from a much broader concept. Ever since the vision of a network-centric IT industry began to take hold, many have speculated that it was only a matter of time until processing power, storage and applications would reside mostly out on the network. After all, if you have enough bandwidth, what difference does it make whether your disk drives are down the hall or across the continent?

My own view is that our fundamental computing paradigms are usually determined by the need to exploit abundant resources and optimize scarce ones. During the mainframe era, machines were expensive and computer personnel relatively cheap, so time-sharing resulted. In the PC era, processing power was abundant and bandwidth scarce, so general-purpose, off-line machines were developed.

In tomorrow's network-centric era, it will be bandwidth that is bountiful and application developers who will be scarce. Consequently, sharing software expertise will be the most cost-effective way for companies to create virtual versions of themselves. Using serveware will be faster, cheaper and simpler than maintaining your own packages.

The implications of this shift will be easily as profound as the shift away from time-sharing and toward PCs. But like PCs, we are looking at a 10- to 15-year transition. Today, the trick is to recognize the early opportunities while preparing for the larger revolution to come.

The signs of change are all around us. Most of us already access more applications, data and processing power on other people's Web sites than we do on our own PCs or even our corporate systems. It's only a small, additional step to store our key files and personal productivity tools on our Web site of choice. Once our data is on the network, we can let our vendors ride the technology curve.

And if consumers go this way, can business be far behind? It's not hard to see many corporations, especially new ones, using Web services to manage payroll, human resources, health plans and other traditional applications. Just think: The burden of service delivery will shift to the software vendor; competing services will greatly reduce software lock-in. It will be, for example, SAP AG that has to make SAP R/3 work. Now that's a revolution. □

Moschella is an author, independent consultant and weekly columnist for Computerworld. *His E-mail address is dmoschella @earthlink.net.*

We all love polls, so let's use them the right way

Michael Schrage

Beyond question, America is the most poll-obsessed society on Earth. I know that because survey after survey reveals at least 7 out of 10 polls are read by an average of 8 out of 10 people — 43% of whom claim they don't even read polls. Just kidding.

Our pathological polling practices produce and consume a lot of the analyses that govern IT perceptions. Not incidentally, they're ideal fodder for editorial coverage. I'm particularly intrigued by all the polls and surveys conducted by the Giga Information Groups, Meta Groups, Gartner Groups, *Computerworld*s and *CIO* magazines purporting to reveal the business priorities of the managerial digerati. So many polls to choose from and, not unlike their political counterparts, their answers often skew according to how the questions are asked.

I must confess that I find looking at the older polls rather bracing. They offer a quick and easy way of tracking how our self-proclaimed priorities shift or tumble over time.

That said, you gotta smirk when you look back at many of the 1996 and 1997 polls of CIOs that not only give short shrift to the Internet, but didn't even make our favorite bugaboo — year 2000 — a top-tier priority. If you really want a treat, look at a *Computerworld* poll of a decade ago. You will be astonished at what has and hasn't changed.

Does that mean our CIOs and technocrats are dumb? Of course not. Does it make them lousy prognosticators? Of course. Predicting the future is a mug's game. This industry has always done a better job of inventing the future rather than predicting it. That said, it also reveals that the demographics and psychographics of IT management have been radically changing.

For that reason, surveys and polls inherently represent a skewed view of the marketplace. But it's interesting to learn when CIOs rank business alignment as a higher priority than Internet awareness or retaining their talent more important than on-time delivery. These efforts to take the pulse of IT offer valuable insight into why CIOs do what they do. Of course, what people *say* is important doesn't often overlap with what they actually *do*. The gaps between word and deed, as well as perception and reality, are where the action really is.

Treat polls and surveys as part of a battery of diagnostics instead of as an endless series of one-shots.

For that reason, I look at IT polls kind of like using X rays to diagnose heart attacks or thermometers to detect tumors: They don't quite capture the key symptoms. That's why I'd like to see more polls of the IT community, but with a twist: Let's see some context. Let's treat polls and surveys as part of a battery of diagnostics instead of as an endless series of one-shots.

Whenever we see a poll of CIOs on business priorities, let's see counterpart responses from, say, the CEOs and chief financial officers or key customers. Better yet, I always love those few surveys that look at the differences between what the top dogs proclaim as their priorities and what their underlings say. What we need aren't better insights into the IT community; we need better insights into the gaps *between* the different IT communities and their relevant constituents. Just as we see political polls breaking out party affiliation, age and/or gender, we need IT polls that highlight where priorities converge and fragment. □

Schrage is a research associate at the MIT Media Lab and author of No More Teams! *His E-mail address is schrage@media.mit.edu.*

Corporate Strategies

Case Studies ♦ Trends ♦ Outsourcing

Briefs

Highest IT priorities worldwide, November 1998

1. Year 2000
2. Increasing alignment with business
3. Improving quality (systems and services)
4. Decreasing costs
5. Updating technology infrastructure

Base: Interviews with 426 companies worldwide

Source: Cutter Information Corp., Arlington, Mass.

Market watch on Web

The Nasdaq-Amex Market Group in New York has developed a Web site with The Stock Exchange of Hong Kong Ltd. (SEHK) that allows investors to track securities, mutual funds and options on their respective stock and options exchanges. The site, which is currently being beta-tested, can be accessed at *www.porttracker.nasdaq-sehk.com*. Prices posted on the site will be delayed by one hour for SEHK companies, 15 to 30 minutes for U.S. quotes and one minute for U.S. indexes.

HR contract

The city of Troy, N.Y., has hired GE Capital Information Technology Solutions and Aquilium Software Corp. in Minneapolis to implement a citywide information system designed to handle human resources, payroll and other administrative functions. The terms of the agreement weren't disclosed.

Crypto group forms

Several major security vendors have formed a consortium aimed at developing standards for elliptic curve cryptography. The Standards for Efficient Cryptography Group hopes to devise ways for various products based on elliptic curve encryption to easily work together in industries such as electronic banking and wireless communications.

To find fuel, first make data flow

▸ *Web, middleware help explorers share*

By Julia King

DRILLING FOR oil and gas is an extremely risky and high-cost venture that even the biggest companies are unwilling to go alone anymore.

To reduce their risks, the industry's giants are teaming up on projects around the world, which makes easy data sharing all the more critical.

Typically, projects take place over several years and involve a few large oil companies plus dozens of subcontractors, including drilling companies, platform fabrication companies and often, engineering project management companies to keep the whole thing on track.

A case in point is the $2.5 billion Sable Offshore Energy Project. Located in the North Atlantic off the coast of Nova Scotia, Canada, the project's objective is to develop six reserves containing an estimated 85 billion cubic meters of recoverable natural gas. The project's four main partners are Mobil Oil Canada Properties Ltd., Shell Canada Ltd., Imperial Oil Resources Ltd. and Nova Scotia Resources Ltd.

The Sable project is using a combination of Web and middleware technology to make up-to-the-minute project data available anytime, anywhere from various partners' computer systems in Houston; Calgary, Alberta; Halifax, Nova Scotia; and London. Using a Web browser, about 200 users worldwide can tap in to engineering, production and cost data plus three-dimensional geological drawings generated by the project's four major oil industry partners and seven contracting firms.

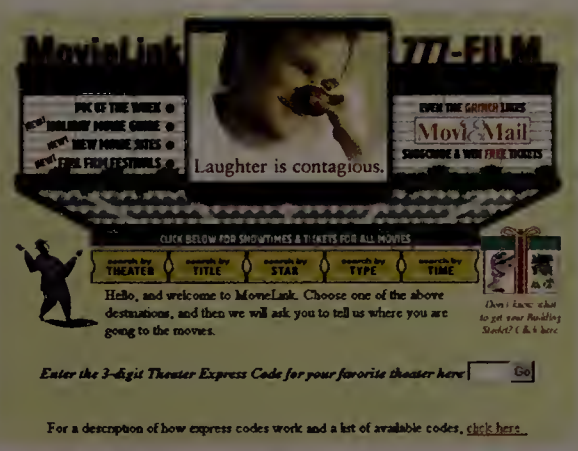
To find fuel, page 24

The Sable Offshore Energy Project users access data via an extranet from a Simware Salvo application server

MovieFone says callers predict hits

By Stewart Deck

IN 1997, MovieFone Inc. started to construct a data warehouse so that it could follow the historical calling patterns of people who phoned in to its free movie-listing service.



MovieFone hopes to sell data to theater owners and developers

The company wanted to make sure it had plenty of phone lines set up to cover peak calling times, and it wanted to dig into some of the data about calls. Pretty standard stuff.

But when the system went live 11 months ago, researchers at the New York-based firm realized that the data they were seeing was even more useful. Data from MovieFone and its sister Web site MovieLink (*www.movielink.com*) could help them quickly advise theater owners on how many screens a blockbuster movie should play on and even let them advise theater developers on picking hot locations.

Seem far-fetched? MovieFone covers more than 15,000 theaters in 38 cities. This year it will handle approximately 60 million calls and 110 million Web site user sessions. Each of those calls and site visits requests data about theaters and films in particular area codes, and sometimes they even conclude with a ticket sale.

"We built a warehouse because we needed to access this information dynamically and drill down into specific markets,

MovieFone, page 24

CVS pilot aims to build loyalty

By Roberta Fusaro

PHARMACY CHAIN CVS Corp. is trying to build customer loyalty and sales in three pilot markets with the help of new customer-level data warehouse software, officials said recently.

DATA WAREHOUSING

The 4,000-store retailer of prescription drugs and health and beauty aids, based in Woonsocket, R.I., is trying to identify buying patterns and do direct mailings based on a customer's previous purchases, said Mark Robinson, relationship marketing manager at CVS, in a recent interview.

But officials refused to provide details on how the campaigns would differ from competitors' customer-loyalty campaigns.

CVS is using Prime Vantage campaign management software from Prime Response Inc. on top of an Oracle Corp. database and its Hewlett-Packard Co. HP-UX-based hardware.

Many retail outlets have tried similar strategies using customer-loyalty cards, said Bob Moran, an analyst at Aberdeen Group Inc. in Boston. And using data warehouses to focus the programs is becoming more common, he said.

For instance, supermarkets have had some success with customer-loyalty cards. And large companies often use data warehouses for such marketing campaigns. □

AT A GLANCE

Who: CVS Corp. in Woonsocket, R.I.

What: Implementing a data warehouse to build and/or expand a customer-loyalty program in three test markets: Baltimore; Albany, N.Y.; and Greensboro, N.C.

Goal: To enhance sales and profitability for the chain and to boost customer satisfaction.

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To find fuel, make data flow

CONTINUED FROM PAGE 21

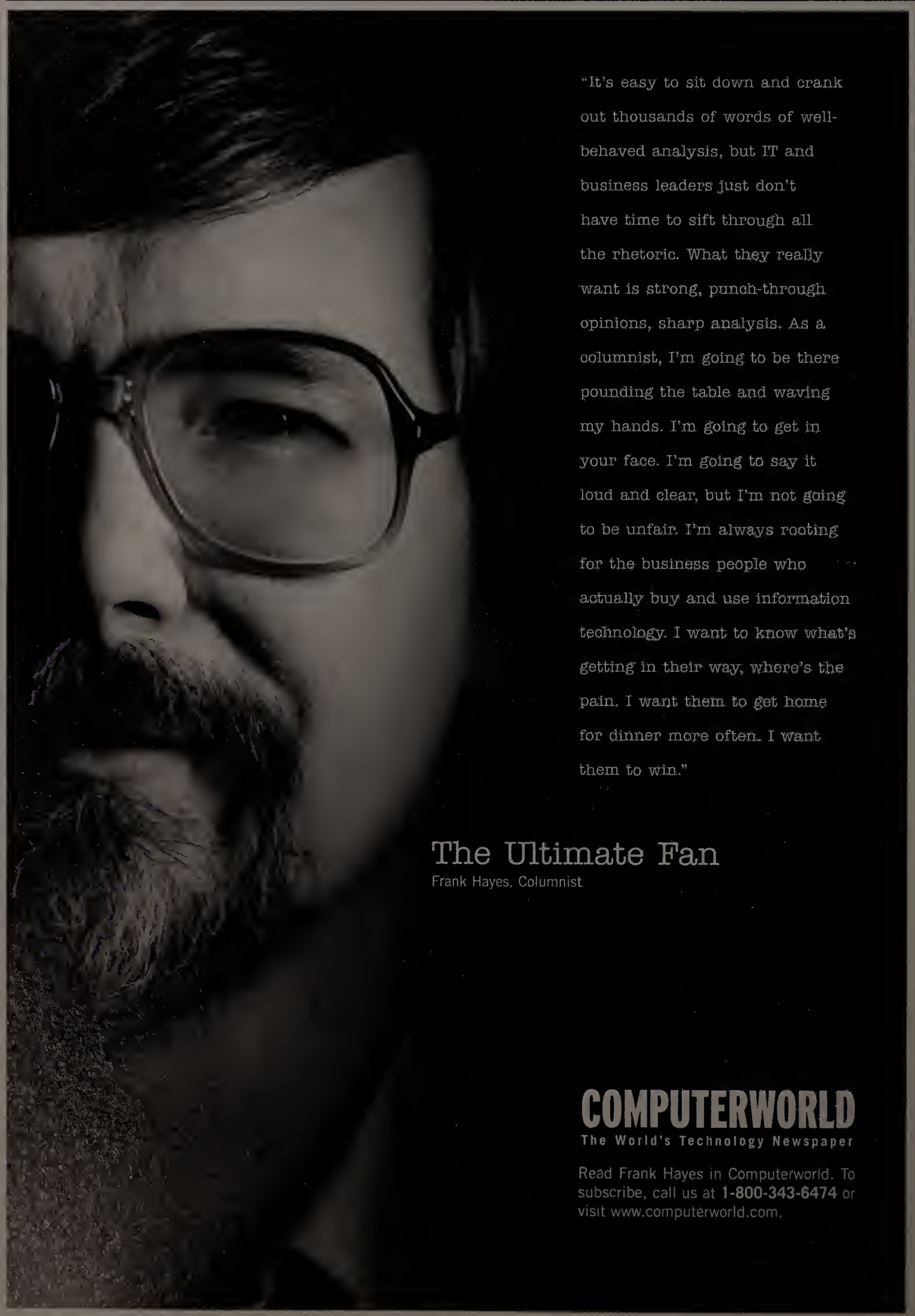
Sable's users access all this data via an extranet from a Simware Inc. Salvo application server, which is both a central warehouse and translator of data generated on a wide range of multivendor, incompatible legacy systems belonging to various project partners.

Prior to implementing the Salvo server, Agra Monenco-Brown & Root, the engineering management companies jointly in charge of managing the Sable project, used separate servers at locations in Halifax and Houston to maintain information, updating the servers using Zip disks once per week, according to Stacey Darragh, a quality assurance manager on the project. The total cost of the extranet project was $350,000.

"The biggest benefit is in productivity because all information is immediately available to everyone," said Hugh MacIntyre, finance and administration manager at Agra Monenco.

Another key advantage of the extranet is that it allows Sable project workers from participating companies to continue using the technologies with which they're already proficient.

By contrast, on the $5.2 billion Hibernia Offshore Project a few years ago, the same four oil industry partners opted to build a project-specific computer system, which ultimately required an IT organization of 47 people to support it. □



MovieFone

CONTINUED FROM PAGE 21

specific theaters and specific movies," said Irwin Miller, vice president of computer systems development.

The warehouse was built on a Sybase Inc. database and business intelligence tools from Business Objects S.A. It uses Sybase IQ for query acceleration.

In addition to providing information about current movies, MovieFone also sells ads in the form of audio movie previews. It uses the warehouse to demonstrate to distributors how effectively those previews turn into ticket sales. Its researchers use the data to map historical patterns and model caller behavior.

Miller said MovieFone is working out how to properly add the Web site surfer behavior data from MovieLink to the warehouse. The researchers hope to have their hands on this data in 1999.

"Retail generally is a good user of data warehousing because so much of what they do is marketing-intensive," said Mitch Kramer, an analyst at Patricia Seybold Group in Boston. Predictive marketing is a pot of gold for retailers, he said.

But Miller said his group has just begun to exploit the warehouse's potential.

"Since we know how many people are seeking information and buying tickets to particular movies, we can now provide exhibitors and distributors with accurate data the day a movie opens," Miller said. If the calling pattern fits the "blockbuster" model, MovieFone can use the data (for a fee) to help exhibitors decide how many screenings to add.

The data may also be used in the future to figure out the best location for new theaters. "If someone wanted to open an art-house theater, they could come to us and ask for a demographic breakdown by ZIP code of people who've requested art films. We can give them ticket sales by ZIP code; they can then choose where to build that new theater for the best results," Miller said.

But one industry observer wondered how much more information distributors and exhibitors need. Distributors already know the good neighborhoods, and moviemakers have extensive demographic audience data from test screenings and focus groups, said Paul Marsh, an analyst at S. G. Cowen & Co. in New York.

"It seems like every company that does [data collection] always figures they can sell the data. If I were a theater company, I don't know if I'd be interested in buying his information," Marsh said. □

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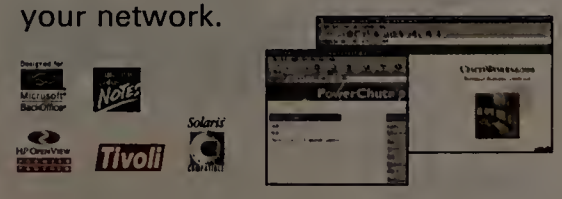

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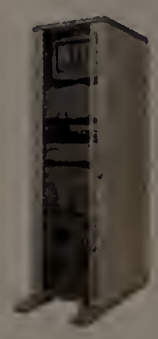

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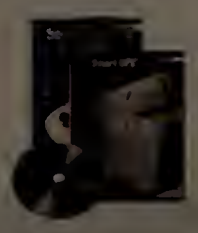
* (InternetWeek/Contingency Planning)



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Internet Commerce

Extranets • The World Wide Web • Intranets

Briefs

U.K. E-commerce lags

In the U.K., purchasing goods online is almost impossible for those not accustomed to it, according to a new study of major U.K. retailers' Web sites. The study, conducted by London-based TesCom Group, found that Web sites fell short when tested on functionality, ease of use, security, performance, use of interactive technology and browser compatibility. In one case, researchers had trouble locating the items they wanted to buy and then encountered JavaScript errors when they tried to purchase them.

E-commerce payments

The NetA division of Barclays Bank PLC plans to develop what it says is the U.K.'s first bank-owned Internet payment system. Barclays Merchant Services will work with Reston, Va.-based CyberCash Inc. to offer payment authorization for credit-card purchases on the Internet. The service will be called EPDQ (*www.epdq.co.uk*).

Mining for news

MiningCo.com, the Internet guide network, said it has picked Listserv software from L-Soft International Inc. for the administration of its 350-plus E-mail newsletters. The New York firm pushes customized information to subscribers' in-boxes via E-mail.

CNN Web site page views

Dec. 16 (when military action was launched against Iraq)	25.7 million
Sept. 11 (release of the Starr report)	34 million
1997 total	More than 2B
1998 total, through mid-December	4.3B

Source: Cable News Network, Atlanta

Start-up taps Web to rent DVD films

▸ *NetFlix corresponds with customers by E-mail*

By Roberta Fusaro

ONLINE BUSINESS

THE EMERGENCE of DVDs and E-mail-based customer service technologies could unlock a lucrative business model for online retailer NetFlix.com in Scotts Valley, Calif.

NetFlix.com was established a little more than a year ago to target an untapped niche in the electronic-commerce market: movie rentals.

Because of the bulk and cost of delivering VHS tapes, renting tapes over the Web wasn't a popular business option, said Jim Cook, chief technology officer and director of operations at NetFlix.com. "It wasn't worth the shipping costs for a $4 rental," he said.

But the small, easy-to-ship format of digital video disc (DVD) makes the product a better vehicle for renting movie titles online, officials said. The discs cost between $20 and $30 each to buy and between $3 and $5 each to rent, plus shipping and handling charges.

One disc weighs less than 2 ounces and costs about 55 cents to ship via the U.S. Postal Service. "We're dealing with much lighter material than VHS tape," Cook said.

The NetFlix.com service works like this: A customer searches for and orders a movie at *www.netflix.com*, and the DVD is sent in an unmarked package along with a preaddressed, prepaid return envelope. The customer can keep the disc for seven days from the day it arrives and then return it via U.S. mail. The company has more than 2,300 titles available for rent and offers delivery within two days coast to coast.

According to InfoTech Inc., a Woodstock, Vt.-based research firm, DVD players were on track to sell more than 1.2 million units worldwide in 1998, a 140% increase from the previous year. InfoTech attributes the growth to Hollywood's acceptance of the medium — a large catalog of films is now available on DVD — and falling PC hardware prices, which are allowing more PC manufacturers to add

DVD, page 32

CINDY CHARLES

NetFlix.com's Jim Cook says the company decided to let users check order status at the Web site after analyzing E-mail queries collected by Mustang's Internet Message Center

News, info remain lead Web activities

▸ *Numbers show Web shopping on the rise*

By Sharon Machlis

Mary Ann Packo is president and chief operating officer of Media Metrix Inc. in New York, a company that measures consumer Web usage for clients such as major Web retailers and publishers. Media Metrix recently merged with one of its prime competitors, Relevant Knowledge, to provide a more standardized way of measuring Web usage.

Media Metrix's Mary Ann Packo says portals with many different offerings generate a lot of traffic

CW: What major consumer trends emerged on the Internet in the past year?

PACKO: There's been a real narrowing of the gender gap. When we began measuring in January 1996, [the Web audience was] 82% male and 18% female. It's getting very close to a 50/50 split [between] men and women.

And when we began measuring [Web use for] news, information and entertainment, only 40% of people were going to those sites.

Now that's over 80%. . . . Media and marketing are kind of merging out there. Portals are [also] offering things for sale.

CW: For people trying to sell to consumers via the Internet, what are the most important things going on?

PACKO: We're clearly seeing increased traffic to what we call shopping sites. That is our fastest-growing [category].

The book category, music category, computers, support and perhaps the auction-type cate-

Media Metrix, page 32

Snapshot

PROFILING INTERNET USERS

	Online more than 42 months	Online less than six months	Not online
Median age (household head)	38	41	49
Median household income	$60,000	$52,000	$29,000
College-educated	88%	65%	36%

Base: Survey of 120,000 North American households, including 8,600 households in-depth; margin of error +/- 2%

Source: Forrester Research Inc., Cambridge, Mass.

e-business

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DVD

CONTINUED FROM PAGE 29

DVD-ROM drives to their systems. Currently, only about 1% of households have a DVD player, but analysts expected big sales of the players this past holiday season.

Early on, NetFlix.com realized that its primary means of communication with customers would be E-mail. Since its launch, the company has been using the Enterprise Edition of Internet Message Center from Bakersfield, Calif.-based Mustang Software Inc. to route hundreds of messages per day and issue automated responses.

"It's not economically viable to have a huge phone bank. So we needed a [software] package to serve as a dispatcher," Cook said.

Besides routing E-mail, the system also provides a way to drill down and analyze questions that the company has received, he said.

"It's not economically viable to have a huge phone bank. So we needed a [software] package to serve as a dispatcher."
– Jim Cook
Netflix.com

For example, Cook said, queries about order status are common. So NetFlix.com used that information to create a "Your Account" feature on the site that lets users check order status themselves. And customer service agents can be dispatched to look into larger problems such as technical problems with DVDs, Cook said.

The company hopes to integrate other systems within the E-mail customer database — including billing systems and personalized marketing programs, said Te Smith, NetFlix.com's marketing director.

COMPETITION

NetFlix.com's main competition comes from video retailers such as Reel.com and Blockbuster Entertainment Group. But Cook noted that those companies are selling, not renting, DVDs over the Internet.

Dave Rochlin, vice president of marketing at Reel.com, confirmed that the retailer doesn't rent DVDs but did mention that it recently launched a DVD-only section of its online storefront. The company uses standard Web forms and E-mail routing software, Rochlin said.

Reel.com briefly tried rentals over the Web but phased out the practice after the company was bought by Hollywood Entertainment Corp. "Logistically, it didn't really work," a spokesperson said. "We found it hard to turn around the product to customers. And it seems like most DVD [users] are buying, not renting." □

Media Metrix

CONTINUED FROM PAGE 29

gory are getting dramatically increased traffic.

CW: What are we likely to see this year?

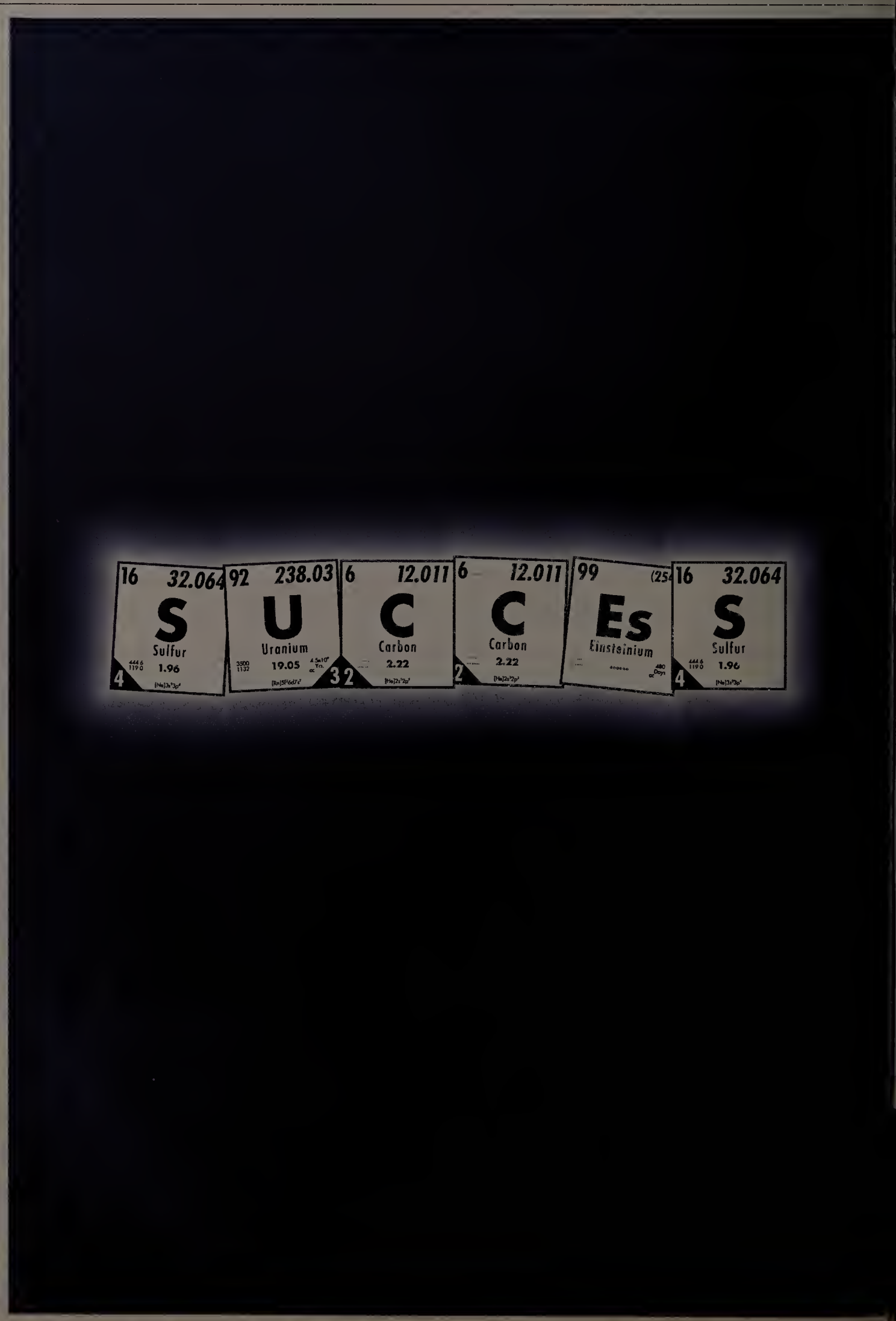
PACKO: One thing we look at every six months is the fastest-growing sites. We'll be doing that again after the year-end numbers. The first half of [1998] had a lot to do with community and relationships on the Web — sites like Tripod and GeoCities. Then there's the whole personalization issue.

CW: Sites offering personalized information and content?

PACKO: We've seen that trend with the portals providing more and more ways of providing 'stickiness' [enticing people to stay on a site once they have clicked in].

They started adding content, news. . . . Now you've seen them add in these personalized features — "Yes, you can get a free home page here as well," or "Yes you can visit these areas [news and entertainment]."

CW: What are the best strategies for



companies trying to attract consumers to their sites?

PACKO: There are two distinct strategies: Appeal to the user in many different ways, or be specialized and draw a defined audience.

CW: Which is working?

PACKO: In terms of traffic, we definitely see the portals with lots of different offerings attracting really strong traffic. We [also] see great repeat traffic to specialized sites. It depends on the company's business purpose for the site.

CW: Was 1998 the year the Internet came of age, with events such as the Starr report being released on the Web?

PACKO: We clearly do see traffic driven by news events. The Starr report was one of our all-time highs in terms of daily usage.

Also, things like natural disasters really drive a lot of traffic to the Web — hurricanes, tragedy, natural disasters.

CW: Are you surprised by the pace of consumers' adoption of Web technology?

PACKO: There have been very aggressive growth projections. I think it's tracking very close to the projections [analysts] have made. □

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NEW PRODUCTS

BROOKLYN NORTH SOFTWARE WORKS INC. has announced Blueprint, Web site analysis and management software that can isolate and repair broken Web links.

According to the Andover, Mass., company, users can repair broken links from within the 32-bit application. Blueprint can institute a global fix throughout a Web site and generate site reports that track link status as well as page and graphic sizes. A scheduler feature eases link maintenance by automatically checking multiple sites at regular intervals. The Business Edition supports up to 100,000 Web pages.

Blueprint Business Edition costs $299.95.

Brooklyn North Software Works
(978) 557-9700
www.brooklynnorth.com

ELECTRIFIER INC. has announced Electrifier Pro, Macintosh-based software for creating compact Internet multimedia files.

According to the Chapel Hill, N.C., company, users can create fast-downloading multimedia that incorporates bit-map and vector animation, digitized audio, synthesized music, video, three-dimensional objects, virtual-reality panoramas and more than 150 special effects such as emboss, blur and fade.

Electrifier Pro integrates with other authoring tools such as Adobe Systems Inc.'s Photoshop, and it plays back using animated graphics interchange formats or Apple Computer Inc.'s QuickTime format.

The software costs $595.

Electrifier
(919) 968-0701
www.electrifier.com

ALLEGIS CORP. has announced Net-It Central 3.0, software for publishing desktop documents to an intranet or extranet.

According to the San Francisco company, the documents can be published using a standard Web browser and can later be viewed without plug-ins.

Net-It Central 3.0 was designed to retain a document's original appearance, whether it's a spreadsheet, report or presentation. Publishers can store information such as project name, author, department or keywords as searchable meta data written in Extensible Markup Language.

Net-It Central 3.0 costs $9,995 per server for unlimited users.

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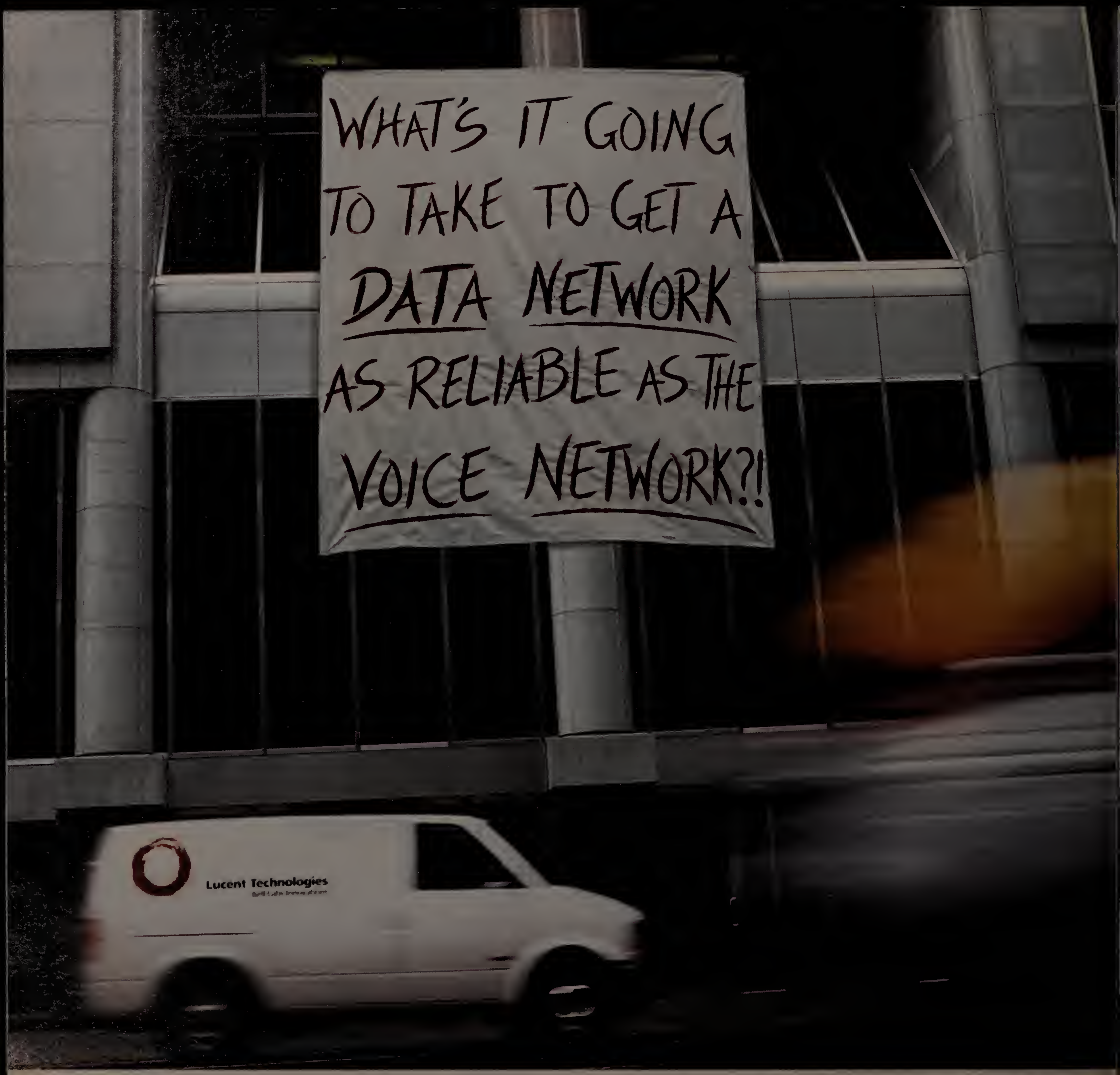

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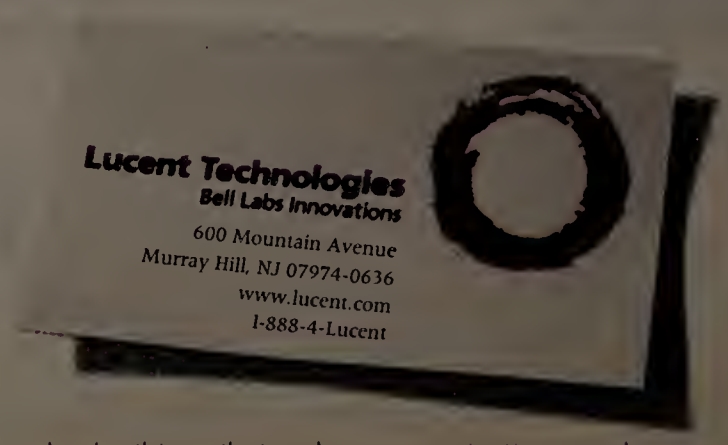

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Briefs

Switch deal

Cabletron Systems Inc. in Rochester, N.H., has announced a promotion in which users who buy three SmartSwitch 6000 Fast Ethernet modules at $6,495 each get the switch chassis and power supply — a $4,230 value — for free. The promotion runs through February.

Workgroup switches

Allied Telesyn International in Sunnyvale, Calif., is shipping two Ethernet workgroup switches. The $1,154 AT-3726XL has 24 switched Ethernet ports, one 10M/100M bit/sec. uplink and a slot for another uplink. The $999 AT-3716XL has 16 switched Ethernet ports, one 10M/100M bit/sec. uplink and a slot for an additional uplink.

Instant AT&T

AT&T WorldNet Service will offer an instant messaging service for its 1.3 million subscribers. The technology is based on PowWow chat software from Tribal Voice in Scotts Valley, Calif. After downloading the I M Here software, users can create a "buddy list" of the names and online addresses of other I M Here and PowWow users and send text messages that pop up on a user's screen like an electronic sticky note. They can host a 10-person PowWow community free for a year. Users can download a copy from *www.att.net*.

Stopping viruses

Cupertino, Calif.-based Trend Micro Inc., a maker of virus-scanning software, has announced InterScan Applet Trap, which the company says stops malicious Java applets, ActiveX and JavaScript at the Internet gateway. The product attaches "wrappers" to suspect applets and code, tracks the code's behavior across the network and can shut down malicious code. Configuration and management are done at the server. Pricing starts at about $180 for a 25-user license. Version 1.0 will ship this month.

Virtual net increases security

▸ *Oil firm: GTE network will cost less than toll-free dial-up connections*

By Matt Hamblen

CROWN CENTRAL PETROLEUM Corp. in Baltimore is deploying a virtual private network (VPN) service that will add a layer of security for remote access and still cost less than the company currently spends on toll-free dial-up connections.

Crown, a $1.6 billion gasoline refiner, distributor and retailer in the U.S. Southeast, has been participating since November in a free trial of a service called VPN Advantage. The provider is the Cambridge, Mass.-based GTE Internetworking division of GTE Corp.

About 150 remote users, including district managers in stores throughout the Southeast and workers in refineries and distribution centers in Texas, connect using the service. They do so by making a local call to a GTE remote access server, which gives them a secure connection across GTE's backbone and the Internet to the Crown network, according to Miguel Montanez, group manager of information systems at Crown.

Projected worldwide market for VPNs*

1998	$150M
2002	$2.4B

*Virtual private networks provided by service providers over an Internet Protocol network

Source: The Yankee Group, Boston

GTE Internetworking offers local voice and data service in nearly every city in which Crown has offices, meaning there's no network delay going through the switches of another local provider, he said.

When GTE Internetworking begins charging for the service early this year, Crown expects to spend 10% less for remote access than the $3,000 to $4,000 it now spends monthly on toll-free service.

"It will achieve savings and also give us the opportunity to outsource our remote access in a way that is secure," Montanez said. "GTE [Internetworking] has the experience to provide that service, and Crown won't have to worry about growing experts in this very complex security technology."

Montanez said he found GTE Internetworking after a formal bidding process targeted at gaining improved Internet access and managed firewall security.

VPN Advantage manages Crown's security through its own network operations center in Burlington, Mass., with device and user authentication through X.509 certificates, Data Encryption Standard encryption and tunneling techniques.

Analyst Matthew Kovar at The Yankee Group in Boston said GTE Internetworking's guarantee of 99.9% availability for users connecting directly across its backbone network makes it the "industry leader" in this area.

Virtual net, page 38

Backing up open files gets cheaper

By Nancy Dillon

IT'S THE NEWS every network administrator hates to give: A file requested for recovery somehow didn't make it onto the latest backup tape.

Gordon Mills recently had to deliver such a bombshell to one of his users. The file that his user wanted wasn't available because it had been left open overnight and was thus skipped by the server's backup software.

Mills is the network administrator at Petroleum Helicopters Inc., an aviation company in Lafayette, La. "On a given night, it's probably 100 files out of 150,000" that are skipped because they are open during the backup, he said. "This may not sound like a lot, but you have to figure these are the files people are using the most."

Mark Nicolett, an analyst at Gartner Group Inc. in Stamford, Conn., said the need to back up active systems is growing. He said products on the high end include hardware-based, data-copy software from companies such as EMC Corp. in Hopkinton, Mass. They can work with multiple data platforms, from Windows to mainframe, and create online data copies for tasks such as backup, testing and data warehouse population.

But for network administrators who don't have to worry about mainframes and who can live with data-copy software designed solely for tape backup, most network backup software now offers sub-$1,000 open-file backup agents.

For example, Seagate Technology Inc. in Scotts Valley, Calif., has a new open-file agent called Open File Option that integrates with the Windows NT version of Seagate's backup product, Backup Exec. The $695-per-server agent creates a disk-volume snapshot without affecting access to files and then sends the volume copy to tape.

"We'll definitely use [Open File Option]," said Peter Buttros, a senior storage architect at AT&T Corp. in New York. Buttros helps oversee more

Open files, page 38

OTHER STORAGE CONCERNS

What are the key problems you face when backing up Windows NT?

Traffic over the network	41%
Takes too much time/slow	39%
Too much downtime	28%
Backup system reliability	26%
Insufficient backup storage capacity	18%

Base: August 1998 survey of 848 user organizations; multiple responses allowed

Source: Find/SVP, New York for EMC Corp., Hopkinton, Mass.

Snapshot

EVOLUTION OF THE E-MAIL BUG

WHEN: Pre-1998 (Attachment era)
DELIVERY METHOD: Virus embedded in attachment
TRIGGER: User must launch attachment for infection
TARGET: Individuals
DAMAGE: Corrupted/deleted files, infected boot sector

WHEN: 1998 (Web page era)
DELIVERY METHOD: Java/ActiveX code embedded in Web page
TRIGGER: Code runs automatically when page is viewed
TARGET: Unsuspecting Web surfer
DAMAGE: Stolen passwords, denial of service, deleted files, stolen data; applets transport other viruses

WHEN: 1999 and beyond (Active mail era)
DELIVERY METHOD: Malicious Java/ActiveX in E-mail
TRIGGER: Code runs automatically when user opens E-mail
TARGET: Entire company
DAMAGE: Thousands of PCs can be disabled

Source: Forrester Research Inc., Cambridge, Mass.

Virtual net

CONTINUED FROM PAGE 37

Availability guarantees on GTE Internetworking dial-up connections drop to 97%, but that number still is competitive, analysts said.

GTE shares the top three spots in the VPN market with Sprint Corp. and UUnet Technologies Inc., a subsidiary of MCI WorldCom Inc., Kovar said.

"VPNs work because companies don't want to do security, or shouldn't," said Ellen Carney, an analyst at Dataquest in Lowell, Mass. "At many companies, the person responsible for security was a network administrator only two days before, and that's not good enough."

If the original VPN pans out, Crown will consider connecting the point-of-sale systems at its 246 service stations to gather sales data, Montanez said.

Equity analyst Alvin Silber at Herzog, Heine and Geduld in New York said investment in fast, secure remote access is standard in the highly competitive oil industry. And, he said, good security might help reduce the risk of network interruptions in Texas, where Crown has been involved in a protracted dispute with union workers. □

IN THE Y2K RACE, THE FINISH LINE IS JUST THE BEGINNING.

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Open files

CONTINUED FROM PAGE 37

than 1,000 NT servers running Backup Exec. "It's really necessary [today] because we have to pick a point and capture as much as we can and move on. We don't have time to return to a file that someone's working on."

Mills said he too plans to implement Open File Option. He has tested the software and said the simplicity of "checking a box to create a job is convenient." But, he said, he would like the freedom to deselect some files to reduce processing overhead.

"Right now, [Open File Option] is more of a volumewide option that's either on or off," he said.

A similar product is Backup Agent for Open Files from Computer Associates International Inc. in Islandia, N.Y. The $795-per-server agent works with CA's ArcServeIT backup software, but unlike the volume-level approach of Seagate's agent, it works on a file-by-file basis.

The offerings from both Seagate and CA provide a generic approach to open file backup: They treat all files the same, whether they're documents, E-mail or database entries.

Officials at both companies said that users who want tighter control over the backup of individual applications should choose backup agents that are database-specific.

An example would be Seagate's $695 Backup Exec Agent for Microsoft Corp.'s SQL Server. Similarly, CA offers a SQL backup agent for $795. □

NEW PRODUCT

ARGENT SOFTWARE INC. has announced Argent Management Facility Release 3.4 — monitoring and alerting software for Windows NT Servers.

The Torrington, Conn., company said the software includes predefined parameters so sites can immediately begin monitoring SQL servers and other critical nodes in the enterprise. It can integrate into management frameworks and send alerts via E-mail or pagers.

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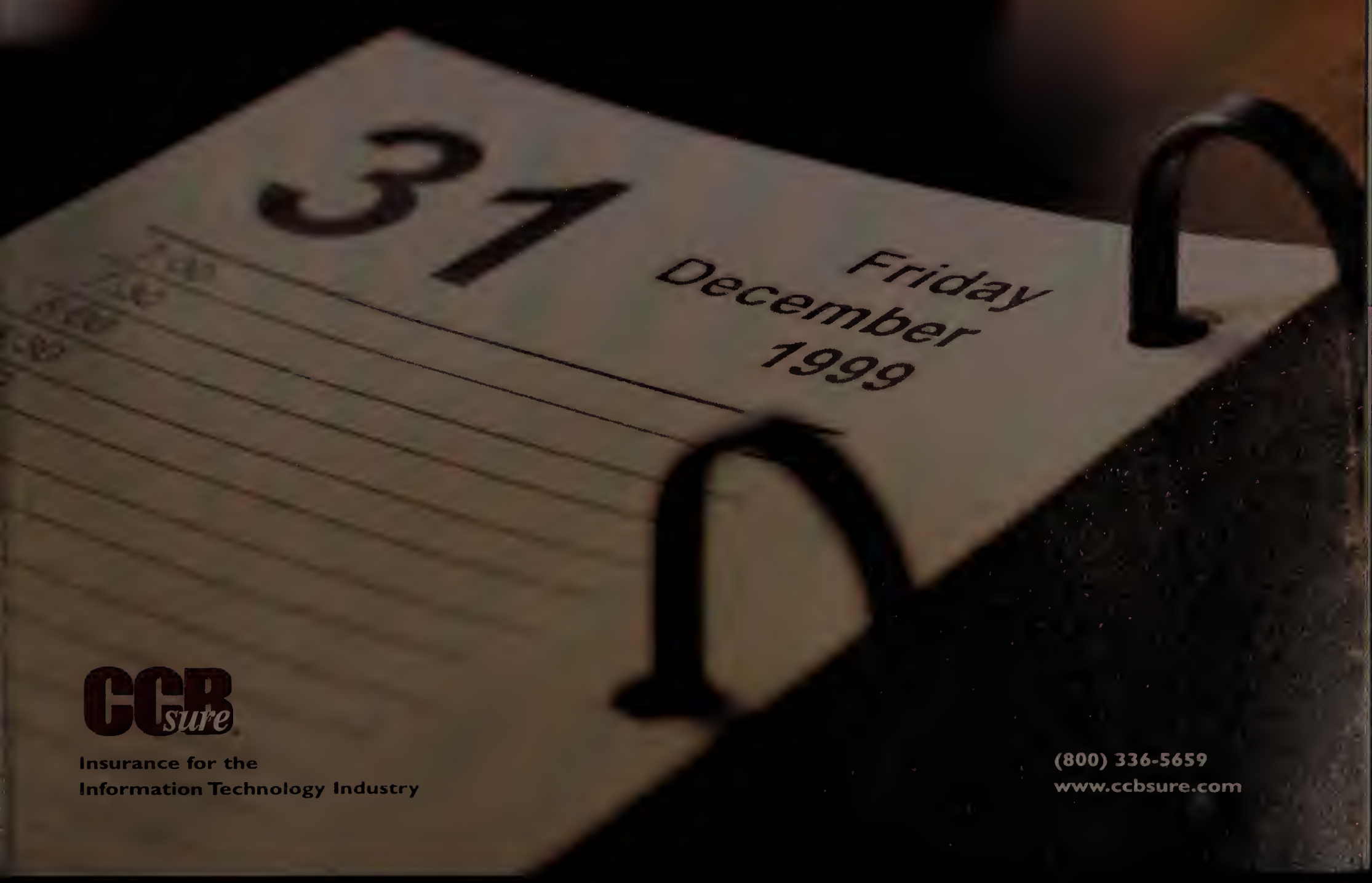

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The NEXT DECADE

20 Visionaries
10 Years

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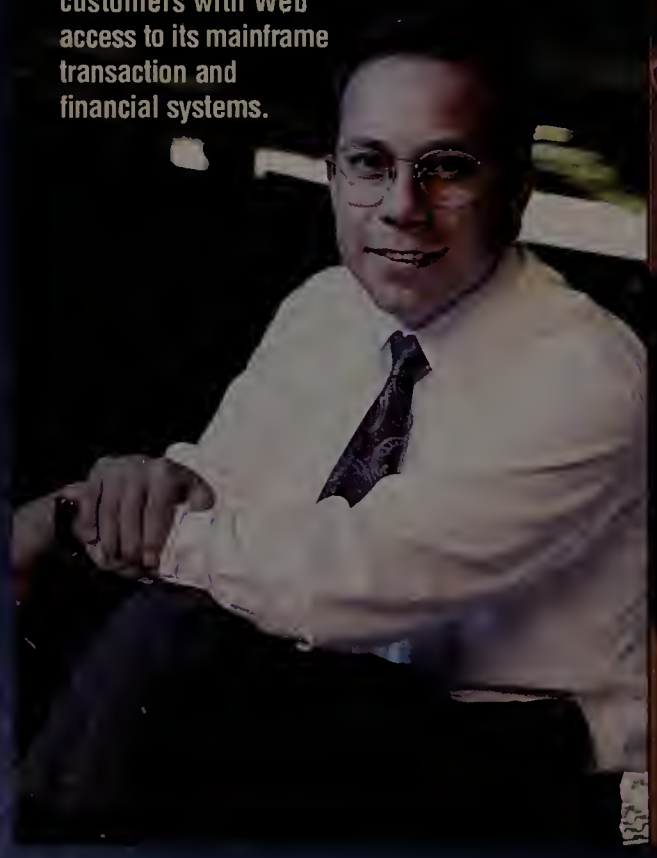
"Information Builders helped us prototype a home banking system in two weeks."

Jorge Sosa, Application Development Manager, Groupo Finaciero Bital

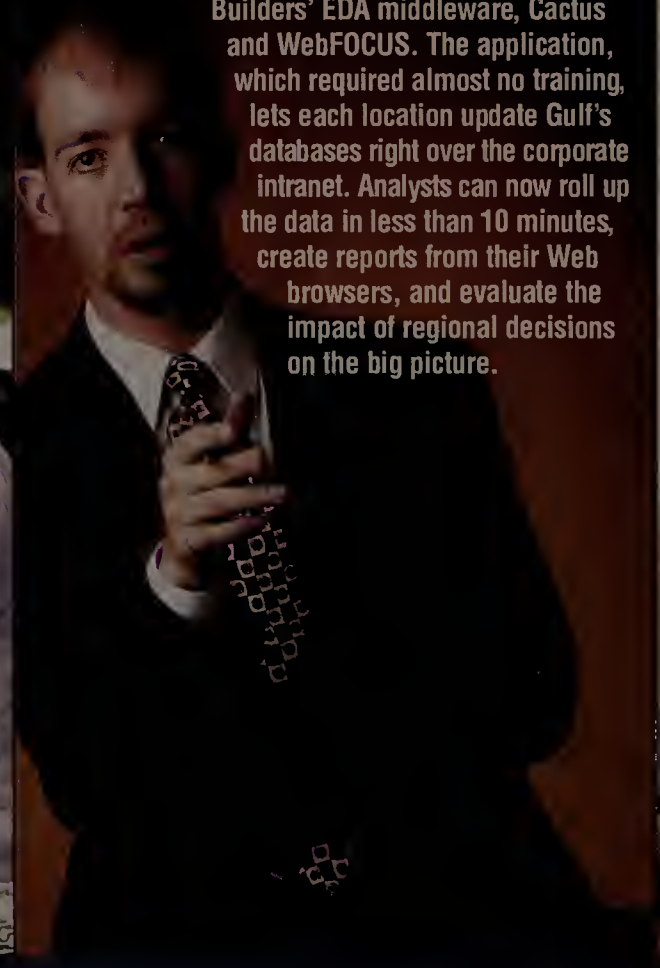
Using Java and Information Builders' EDA middleware, Groupo Finaciero Bital in Mexico City is able to quickly create applications that provide managers and customers with Web access to its mainframe transaction and financial systems.



"With our new intranet-based decision support system we are able to roll up budget projections in less than 10 minutes."

Kevin Rasmussen, Expert Application Coordinator, Gulf Canada

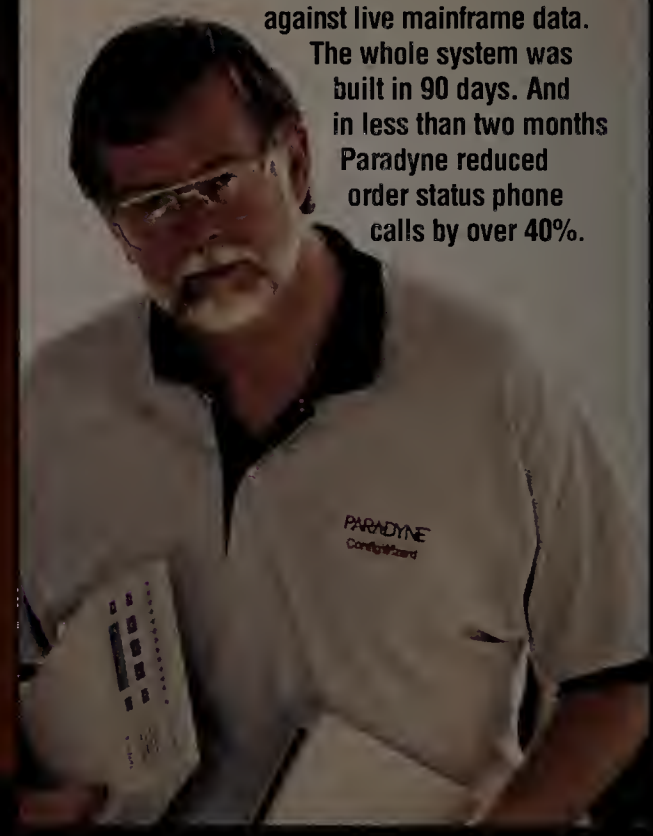
In the oil and gas business, proactive monitoring of production and costs versus operating budgets is a mission-critical function. That's why Gulf decided it needed a faster way to collect and analyze this information from its field locations around the world. The solution... a Web-enabled data entry and reporting system using Information Builders' EDA middleware, Cactus and WebFOCUS. The application, which required almost no training, lets each location update Gulf's databases right over the corporate intranet. Analysts can now roll up the data in less than 10 minutes, create reports from their Web browsers, and evaluate the impact of regional decisions on the big picture.



"In less than two months, we reduced order status calls by 40%, enhanced customer relations, and stimulated new business by driving customers to our Web site."

Dan Bond, Data Warehouse Manager, Paradyne Corporation

Using Information Builders EDA middleware and WebFOCUS reporting engine, Paradyne built a Web-based order status system that allows customers to launch dynamic queries against live mainframe data. The whole system was built in 90 days. And in less than two months Paradyne reduced order status phone calls by over 40%.



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FROM THE EDITORS

HERE'S THE MOST REVEALING thing you can say about the pace of change in computing: One day, the speed of light will be a bottleneck.

No wonder predicting the future is difficult.

But the IT industry has never lacked people who are willing to take on a challenge. We found 20 visionaries who gave it a shot. Rock stars, recent college grads, Internet pioneers, veteran CIOs — a roster of dazzling depth and breadth.

It was an honor to put this special issue together. We believe these visionaries paint a compelling picture of what's to come in the next decade. Some may have logged more computing decades than others, but through a vast array of strategies and technologies, they are all shaping one future.

Ten years is closer than you think. Take a look ahead and enjoy.

Steve Ulfelder

Joyce Chutchian

For audio and extended versions of these stories, see our Web site at www.computerworld.com/nextdecade

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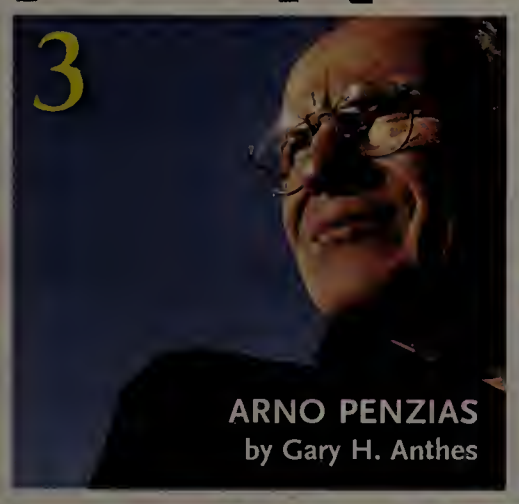
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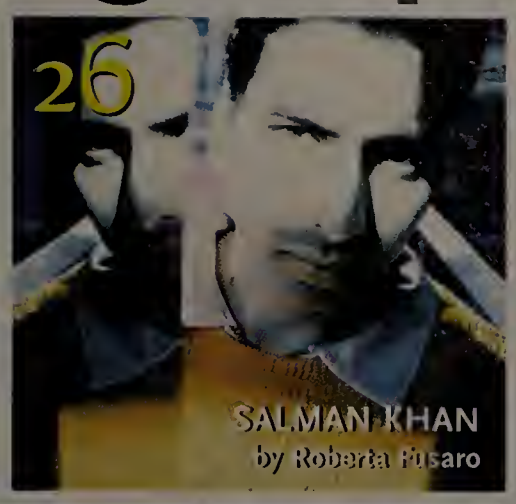
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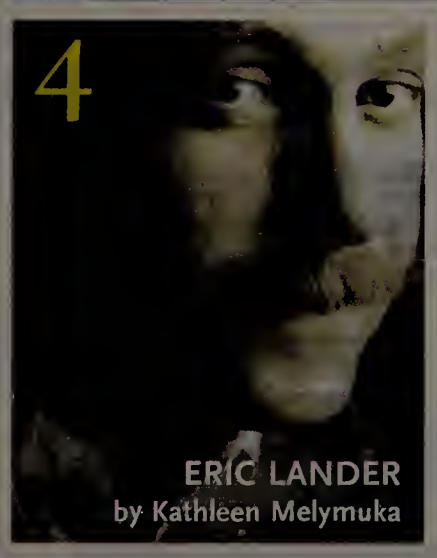
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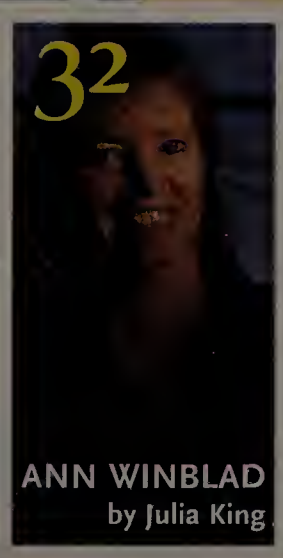
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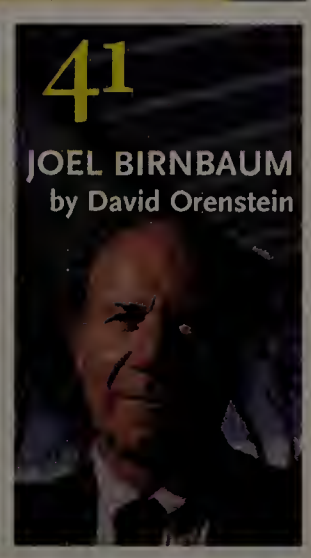
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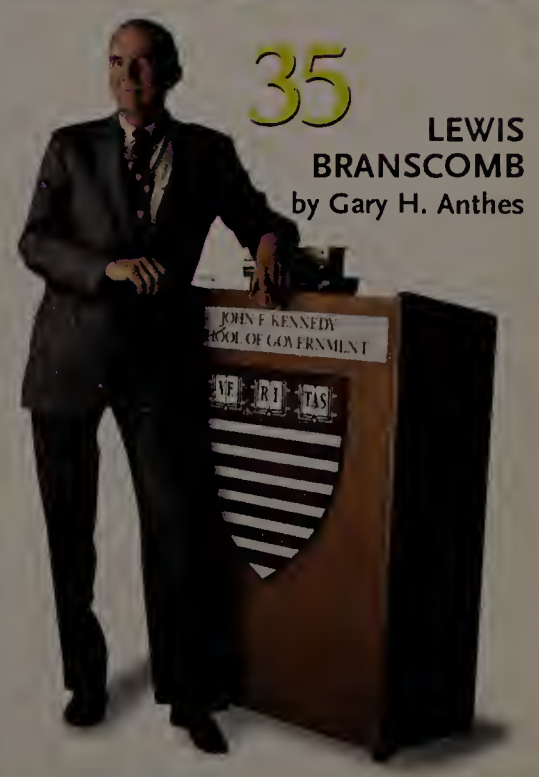
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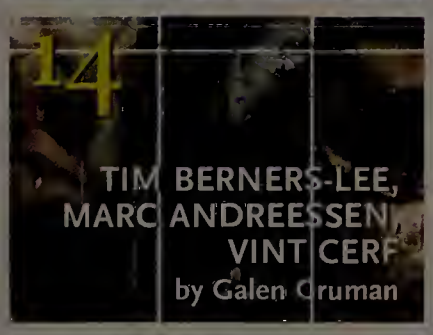
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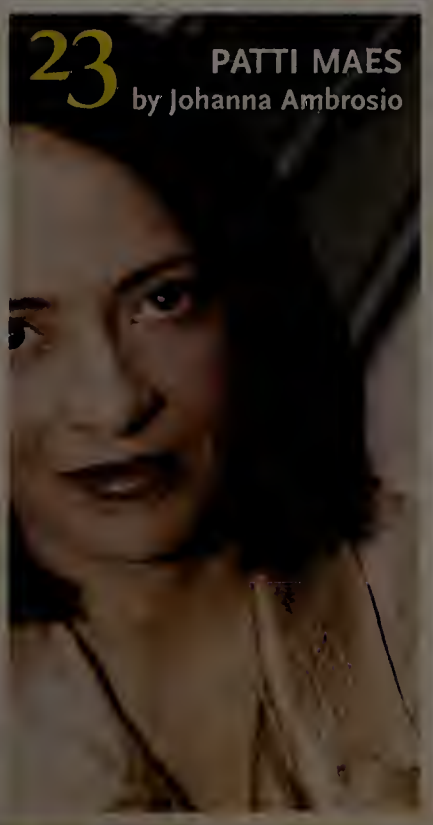
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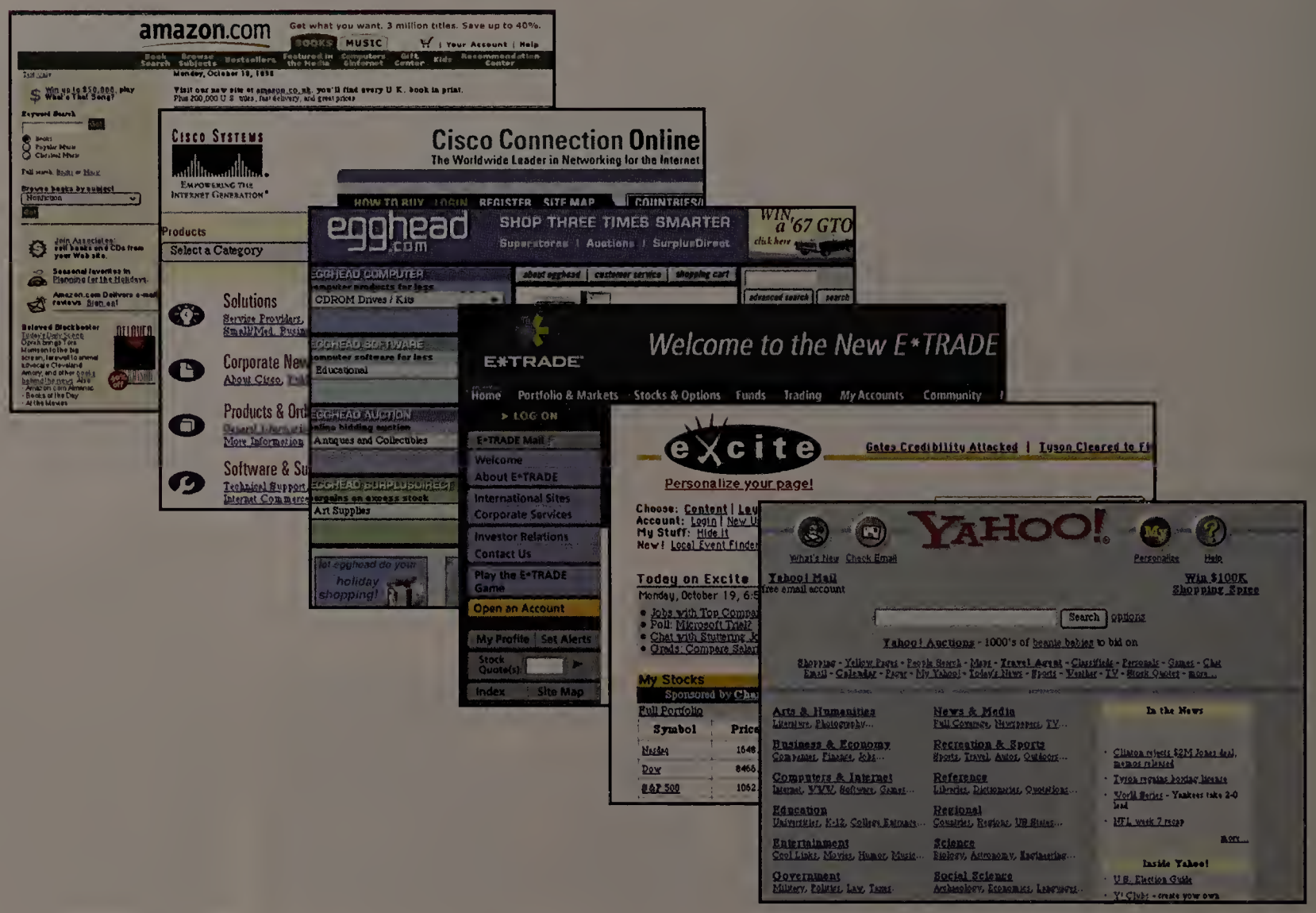
The biggest and best Web sites use Oracle.



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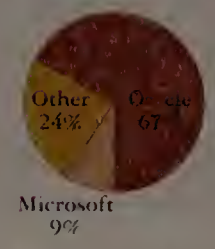

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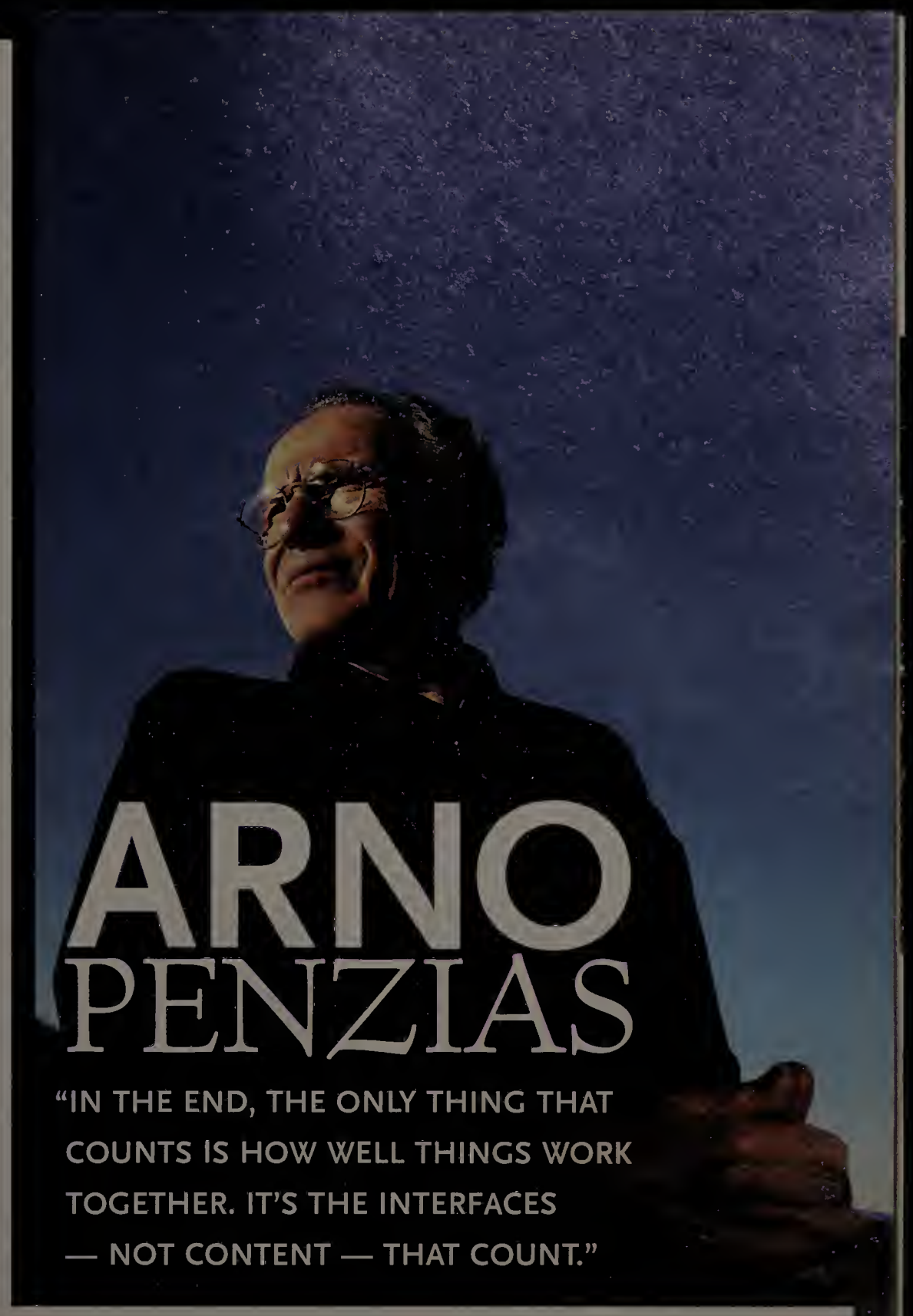
Glass Village



FEW PEOPLE CAN MATCH THE BREADTH OF VISION of physicist and communications wizard Arno A. Penzias. He shared a Nobel Prize in 1978 for his discovery of radio waves that were sparked 15 billion years ago at the universe's Big Bang birth. But he's equally comfortable in realms where events are clocked in nanoseconds. Penzias, 65, recently retired from his post as chief scientist of Bell Laboratories, the R&D arm of Lucent Technologies Inc., where he worked for 37 years on projects that ranged from radio physics to calling-card fraud prevention. He recently spoke to *Computerworld* editor at large Gary H. Anthes.

CW: How will networking evolve?
PENZIAS: Instead of one size fits all, we'll see a multiplicity of specialized global networks — networks for telephony, a high-powered Internet, an [Asynchronous Transfer Mode] fabric, maybe a network for data backup. At the lowest level, we'll see group fabrics. Home networks are group fabrics, but I won't call them "local" because your elderly relative in a nursing home will be on it. It will take care of not just telephones but computers, faxes, burglar alarms, pet monitors — all kinds of stuff.

CW: So everything will be connected?
PENZIAS: Yes. Many home appliances will have IP addresses; it's cheaper to make networked appliances than stand-alone ones — the boxes cost nothing per pound, and you centralize the complexity.

CW: Who will manage this centralized complexity?
PENZIAS: The care and feeding of your network will be by a telephone company, or telephone-like company. For them, dial tone is no big deal; transmission is no big deal. The only big deal is making everything work together, and you'll pay them to do that. Service providers will need to attract connections with other entities — such as the speech-recognition system you've trained — to compete for your business.

CW: The telephone company will program my VCR?
PENZIAS: To some extent, they'll have to because you're not going to be able to do it. Things you used to do for yourself, like your income tax, you don't do anymore because they are too complex.

CW: What will happen in the workplace?
PENZIAS: Much will be customized for the individual worker. That's how you get maximum productivity. McDonald's does this now. The person behind the counter who can't make change just pushes the button for the Big Mac. Interfaces will be designed for you. You may be left-handed, or a terrible speller. You have certain quirks, and over time, the machine will take care of that. Individual programs will grow increasingly customized as they get used to your behavior through background data mining. You don't get rid of standards, but you can make it look standard to the machine and custom to the user.

CW: What will be the killer apps in the corporation?
PENZIAS: Data mining will become much more important. Your bank will know everything you've bought. Companies will throw away nothing they know about their customers because it will be so valuable. If you're not doing this, you're out of business.

CW: What are the systems implications of that?
PENZIAS: There will be huge databases everywhere. They will get bigger than processors, so you have to back them up in some mountain in Tennessee at night. You're not going to do that through an IP network. You'll have some super-SCSI thing in the back with a fiber-channel network. This will not be on the Internet. It will be a different network altogether.

CW: Won't people object to all this data gathering?
PENZIAS: There's no way to keep the information away from the vendors you use. But there will be laws saying companies can't sell the information. You may get better service as a result, but you ought to demand that no one sell it without your permission. We're living in a glass village — glass fibers so you can see everybody, and glass walls so they can see you.

CW: Will there be major improvements in software quality?
PENZIAS: Software will always move to the break point. The bells and whistles — the bloatware — that people come to expect are phenomenal. The stuff will always crash because there's no way to exhaustively test it. There are things like Linux that are quite robust, but they don't do all the stuff you'd expect. Every part of Windows 95 works perfectly, but the pieces don't work together because it's got too many parts.

CW: So developers should focus more on interfaces?
PENZIAS: Yes. In the end, the only thing that counts is how well things work together. Why does anybody buy Microsoft Word instead of WordPerfect? Because it works with something else. It's the interfaces — not content — that count. □

William Mercer McLeod

The game of life

"BEING A PURE MATHEMATICIAN, I THINK
BUT THEN YOU HAVE TO TURN YOURSELF

ERIC LANDER

By Kathleen Melymuka / IN 1974, AS A STUDENT AT NEW YORK'S PRESTIGIOUS Stuyvesant High School, Eric Lander won first place in the Westinghouse Science Talent Search for a paper on quasiperfect numbers. He noted in his application that the project gave him "a respect for the computer as a useful tool rather than just a toy."

The fact that 17-year-old Lander had considered Stuyvesant's IBM mainframe a toy hints at where this kid was coming from. The game he played on it hints at where he was heading. "We played the game of life," he says. "Cells are born, develop into self-organizing patterns, die."

Today, the 41-year-old Lander is one of the major players in the Human Genome Project, a 15-year effort, begun in 1990, to identify all 100,000 or so genes and determine the exact code inside each, a total of about 3 billion fragments that make up human DNA.

Lander says that the human genome map will provide medicine with the kind of dramatic insights that the periodic table contributed to chemistry and that scientists will use it to begin to understand how genes function in diseases and inheritable conditions.

When Lander looks ahead to the next decade, he focuses on simplicity. "In science and biology, there aren't very many problems I know of where we're fundamentally unable to do something just because of a computing limitation," he says. "We're not limited by the availability of good ideas or the computers to run the software, but it takes longer to turn a good idea into good software than it should."

The challenge is to simplify the task of writing code, he says. "If it was 10 times easier to write good stuff, that would have more of an effect than a tenfold increase in speed."

The need to simplify runs through all of Lander's ruminations about 2008. "Being a pure mathematician, I think of computation in a very simple way, but then you have to turn yourself into a pretzel to actually compute," he says. "There are far too many utterly irrelevant details you have to know to interact with a computer."

In his own life, for example, Lander has PCs in three offices at work and an office at home. He has a portable PC and a cellular phone, "and they all still remain different from each other," he says. "The real achievement will be a much more seamless integration."

Lander says he hopes that by 2008, people will use the power of computers to make interacting with them simple and uniform. "Whether we'll achieve that in 10 years, I don't know," he says, "but clearly we will make some progress as computing insinuates itself into other aspects of life."

But just what those other aspects might be could use some prioritizing, he says. Landers says he thinks the *Jetsons*-inspired visions of technology's future miss the point.

"I'm not so much into my home being so smart it can turn on the light," he says. "Turning on the lights is not that big a problem for me. But I do mind that my ways of gaining access to information are still clunky."

Lander says the zenith of clunky information access is the Internet, and here he sees the main challenge and the real promise of the next decade. "[The] Internet is a spectacular thing," he says, "but it's still unbelievably complicated to get a coherent picture of what's out there, and every day the same search pulls up more and more."

DIFFICULT TO DO

The more difficult it is to do something, the less often we do it, he says. And we use it in fewer aspects of our lives. "We haven't built a system to digest the information in a more coherent way," he explains. "The goal has to be to make it so natural and smooth that when we want to know something, we can just get it."

Currently, Lander says, the Internet is like a card catalog you use to pull down books instead of a database with answers to questions. "The thing you want to be able to do that you can't do now is phrase queries," he says. "The challenge is to make [the] Internet have a front end to which you can ask intelligent questions and get reasonable answers rather than a data dump."

Today's technology is clearly on the way to that goal, he says, with specialized agents programmed to retrieve all kinds of information. But the challenge is to create a general agent, not a specialized one — "a system that can parse what you're trying to look for."

The improved Internet will bring technology's biggest impact: connectivity, which will redefine communities and so have "a huge impact on the world," Lander predicts. "We're just beginning to glimpse the consequences of being able to connect with knowledge and people in these ways," he says. "If we can overcome the ergonomic challenges of making it natural and easy to use, that will have an effect on culture that is really hard to estimate."

For example, connectivity will change the way we work and live, he says. "When we have ready and easy and smooth access to video technology, I believe we can have meetings that aren't in person but still have face-to-face quality. Now, bandwidths are not up to it. We kid ourselves. But there have to be ways to use interfaces with computers to be able to meet with somebody in a satisfying way. When you can truly feel a presence with somebody over a high-speed network, it will really transform community." □

JEOF SPIRO

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STARTING HIS FOURTH DECADE IN THE limelight, musician and philosopher/trendsetter David Bowie is no stranger to technology. Since the mid-1980s, Bowie has used his Macintosh to create lithographs and write lyrics. Now, at age 51, he's into the Internet. BowieNet (*www.davidbowie.com*) is his latest project, a portal at which Bowie keeps a personal journal and chats every day with fans. (He also lurks in chat rooms under a handful of assumed names to observe.) Next, Bowie wants to add three-dimensional avatars — on-screen representations to let members create online personas. He also plans to broadcast a live recording session with a 360-degree camera from Lucent Technologies Inc. All this, he tells *Computerworld* senior editor Kim S. Nash, is so "we can know each other in new ways."

Ch-Ch-Ch-Ch-CHANGES

BOWIE SPEAKS: My interest in the Internet arose more than anything else because of my son's interest in computers. Being the doting father, I got involved because he was involved, in 1993 or '94. Before that, I was using the computer for writing and painting.

Then a friend of mine in Silicon Valley developed a cut-up computer program for me where it takes my chunks of prose and reassembles them for me. You end up with something very surreal.

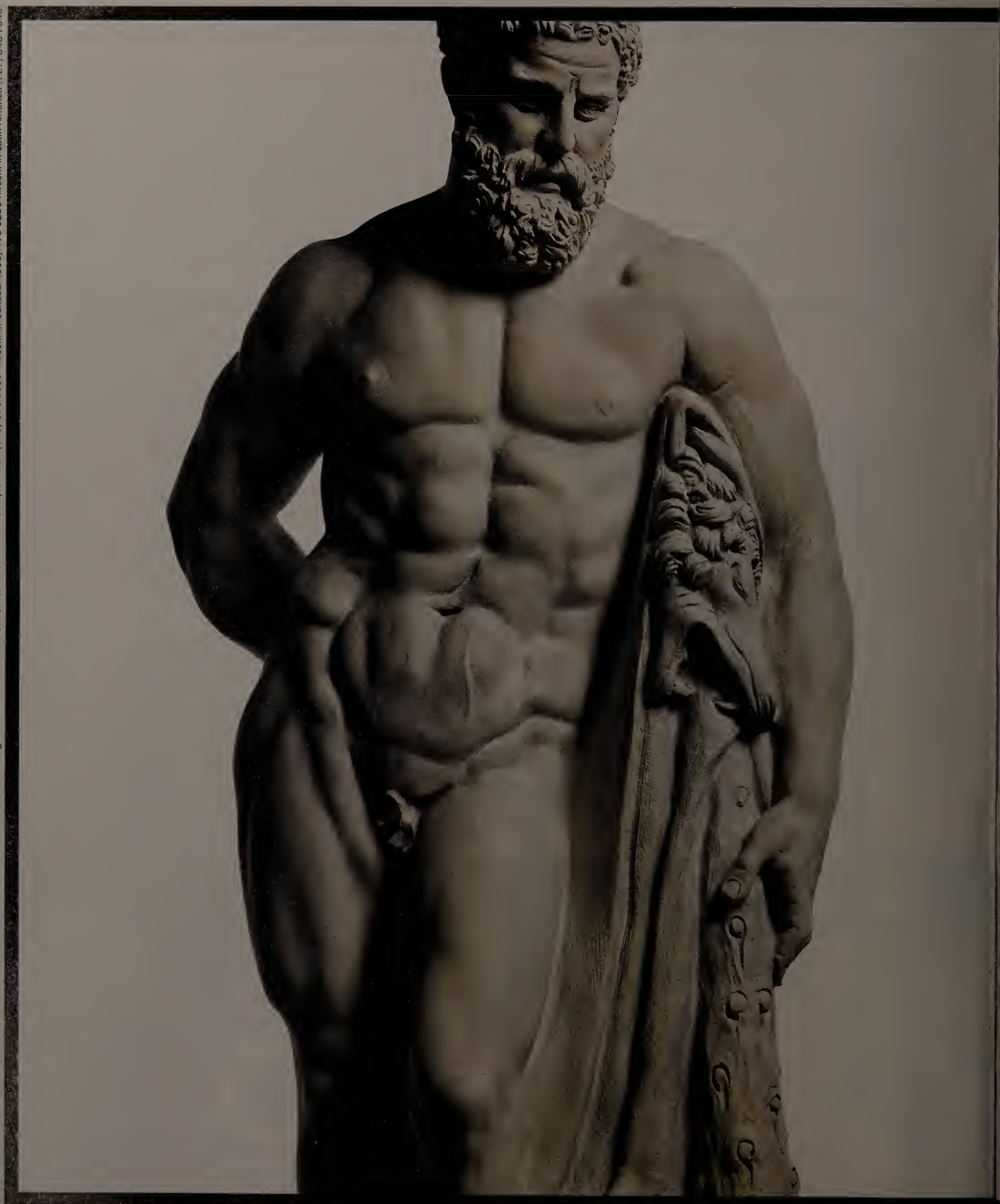
Cut-up prompts your mind into action. It might display something that you hadn't thought about or shine light on areas that, in rational thinking, maybe wouldn't have gotten there at all. But it's not new. It's the way that, indeed, James Joyce and William Burroughs worked, but they tended to work with scissors and glue. I thought, "Well, hell, it's such a bore to cut up lines of poetry or dialogue and reassemble them." So now the computer produces reams of stuff at my command. I took care of lyrics for the next hundred years! That form of writing is chaotic like the Internet, and like the Internet, will continue to be into the future.

I couldn't wait for the day to put up my own site. Virgin Records worked with me in 1995 to do it. But that was really a puff site.

About a year ago, I realized there were so many fan sites on me — 200 or so. I discussed the idea of integrating them somehow and that evolved into a sort of quirky portal; an individual-

CONTINUED ON PAGE 12

DAVID BOWIE



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DAVID BOWIE

CONTINUED FROM PAGE 9

ized portal that revolves around me and music. There's no advertising: We want absolute freedom.

The chaos factor is a very important part of the Net. The most attractive thing is its decentralized nature. Despite what people say about Microsoft and all that, there's no real way it can actually be monopolized, and there never will be. Certain companies will try to eat up everything, but it's not going to happen. There will always be so many cowboys out there to keep it alive.

Someone said it's almost like having 1,000 books on your floor and not knowing where to start. That's how I live. That's how I think! The Internet really is a technology model of how I think. It thrives on its own chaos. It's willing to change its mind overnight, combine things that shouldn't be bedfellows. I see it as a brother.

"THE NET THRIVES ON ITS OWN CHAOS."

The Net will become more and more exploratory, reducing itself into many, many smaller and informal units. Portals will emerge and dissolve with regularity. Corporate brand-name [Internet providers] will lose their flavor. People will want to keep the village aspect of the Net. We're banking on that. We're not sitting there counting eyeballs at BowieNet.

What's missing and will not be corrected in 10 years is the ubiquity of the television. Television is in everybody's home, and that isn't going to happen with the Internet. Maybe we'll get to 50%. This produces a technology version of haves and have-nots. Information is gold, there's that. But also schools that have the Net will have higher scores than those that don't. And that gulf will only widen. That's rather disheartening.

People ask me about the distribution of music over the Internet. My heart says one thing, and my wallet says another. Once everyone has his own CD-burning machine, you will put together the album of your dreams. That's what I'd like to do: Go to a heavyweight blues category and take down a particular track by Robert Johnson or John Lee Hooker. I'd be quite willing to pay per track.

The record corporations are just like King Harold, sitting there on the beach, on this throne, trying to order the sea back. They don't stand a chance. The industry isn't going to come crashing down, but [custom albums online] will be integrated into a new way of selling. They will not be able to stop this. There are too many little independent companies keen to do real online downloading. They will become so popular that, by force, corporations will have to capitulate. When there's a dollar in it, watch their knees bend.

Everyone talks about wearable computers in the years to come. Whether I go for that has an awful lot to do with who designs them; I'm quite fastidious about what I wear [laughs]. These huge vinyl boots — when you're 18, that's OK, but not when you're 52. You hear about air-conditioned cooling suits or visor helmets so we can watch stock options flash before our eyes while we send E-mail from our wristwatches. It's all too silly.

Within the home, I love the idea of intelligent buildings completely wired, though I don't think I'd have anything like the Bill Gates house. I don't want it to look like you're living inside HAL — though I don't mind HAL living with me. But I like old-fashioned paintings on my wall. No flat video representations of them, either. I want to touch the paint and feel statues.

As pieces of my body start falling apart, I'll have them all replaced. All the ones that make life worth living — I'm talking of the brain, of course [laughs].

I suspect that I won't be living in a very different fashion in 2008. Why I fight the idea that my lifestyle would change is because it really didn't change that radically in the last 20 years. I don't see why it would in the next 10.

There's an in-built expectation [created] by this stupid millennium business. The buildup to the millennium is going to cause this agitated state between exhilaration and panic. Next year could be a frightening year. There will be such an enormous letdown when you wake up in 2000 and realize it's just another rainy Tuesday and your life hasn't changed, for the better or worse

The biggest lifestyle change will be [illegible] parents and children. Unless parents get themselves computer-literate, there will be a real disparity in knowledge and reference points. The child will think the parent is stupid, and the parent will become frustrated and angry that he can't understand [illegible]

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That's what **MARC ANDREESSEN**, **TIM BERNERS-LEE** and **VINT CERF** have in common: They were instrumental in creating the Internet as we know it.

The first building block came from Cerf, who co-developed the TCP/IP protocol with Robert Kahn in the early 1970s and later ran the Internet effort at the U.S. Department of Defense's Advanced Research Projects Agency (ARPA), which funded many key Internet and computer developments in the '70s and '80s. He's now senior vice president for Internet architecture at MCI WorldCom Inc. in Jackson, Miss.

Then, in 1989, Berners-Lee created the Web while working at the CERN physics laboratories in Switzerland. He's now director of the W3 Consortium, a council formed to steer the Web's development, at MIT's Laboratory for Computer Science.

The last building block came in the early 1990s from Andreessen, the principal architect of the first graphical browser, Mosaic, while he was a student at the University of Illinois at Urbana-Champaign. In 1994, he co-founded Netscape Communications Corp. in Mountain View, Calif. Recently, Netscape agreed to be acquired by America Online Inc.

Though each contributed a key building block to today's Net, none of the men sits around reminiscing about accomplishments.

CONTINUED ON PAGE 16

VINT CERF

When the networking pioneer left ARPA for MCI in 1982, colleagues wept

TIM BERNERS-LEE

Now director of the W3 Consortium, Berners-Lee created the Web as a way to efficiently share information with CERN colleagues

Netscape co-founder Andreessen brought the Net to millions, first with Mosaic, then Netscape

MARC ANDREESSEN

ERIC YANG

Net, Web, Browse

CONTINUED FROM PAGE 14

Instead, they're working to move the Internet to a new incarnation: a globally distributed network where information is accessible anywhere via a slew of terminals — from cell phones to desktop PCs.

Computerworld West Coast bureau chief Galen Gruman asked the three fathers of the Internet to share their vision of what technology will bring the world in a decade. Their global-network vision is familiar to fans of *Star Trek* and other science fiction. But like most high-tech leaders in Silicon Valley, for them, it's the working plan for the future they continue to create with each new product, each new standard and each new technology.

THE INTERNET COMPUTING VISION

ANDREESSEN: No matter where you go, you'll have access to a computer of some kind that will allow you to tap in to your personal space and your personal information. So if we're working on a document in our office and then in a plane, there'll be a keyboard sitting there on the plane that will let us keep working with it that way. And the same thing in the hotel room, and the same thing in our pocket for the cab ride the next day, and the same thing at the next office we visit the day after that.

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www.computerworld.com/nextdecade

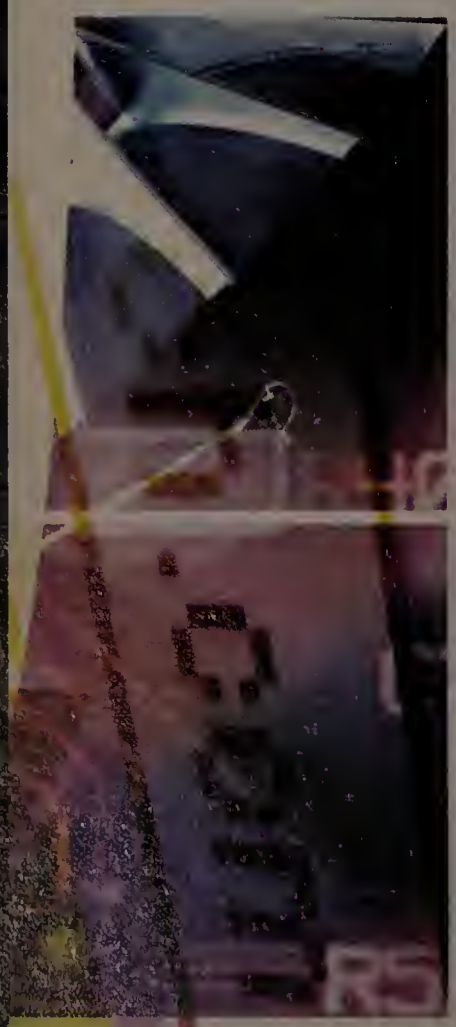
of catalog items — are exported as data.

CERF: One of the things that I found very attractive about some of the network applications is that rather than sending, for example, a big 25M-byte PowerPoint file along with an E-mail message, you send a very short message with a pointer to [the PowerPoint file]. And if you wanted to do something with it, you might be able to cause some other computer somewhere else on the network to do whatever it is you need it to do, or cause it to be printed somewhere else, without having to have it transmitted to you through what might turn out to be a pretty limited pipe. So this idea of getting multiple computers in different places to cooperate, to perform a function that you might have otherwise done locally, seems to me rather attractive.

BERNERS-LEE: The world works exchanging documents that use different vocabularies and different languages, but where there's enough partial understanding of one — where there's enough ability to be able to convert to be able to get by. With [Extensible Markup Language] and [Resource Definition Format], we are building into the technology the ability to communicate with partial understanding. This is going to be essential for the evolution of Web applications.

"PHASE 1 HAS MADE THE WEB INTO ONE BIG BOOK IN WHICH PEOPLE BROWSE AROUND, WHICH IS COOL. BUT PHASE 2 WILL MAKE IT INTO ONE MAJOR DATABASE."

— TIM BERNERS-LEE



CERF: We need computing power distributed all over the place, and there will be times when it is quite necessary to do stand-alone kinds of computing, even if we're mostly connected to the network. The advantage of being able to get into the Net is that you can get to both databases and computing resources that would not be economically attractive otherwise. Making that more or less transparent so you can get to the resources that are appropriate at the time is one of the more exciting potentials for having continuous connectivity to the network.

GETTING THE INFRASTRUCTURE

ANDREESSEN: The goal is fully dynamic electronic commerce, where every business is online and able to buy or sell on a moment-by-moment basis — able to do real-time auctions and bidding for products from all over the world. But most of the systems required to really do that don't really exist.

CERF: One of my favorite fantasies is the idea of having almost incidental invocation of a business service as a consequence of an electronic transaction, where if you're going to do a transaction with someone and you're both mutually suspicious, a third party could offer insurance to cover both sides of the transaction. And all of that could be invoked automatically, and even competitively, if we had the right mechanisms in place.

BERNERS-LEE: Web Phase 1 has made the Web into one big book in which people browse around, which is cool. But Web Phase 2 will make it into one major database. An agent will check whether the transaction meets your privacy needs, your financial trust needs and whether the people you're dealing with in the chain are reasonable according to your particular threshold. But before it can happen, we've got to establish a whole infrastructure in which all the bases for electronic commerce — the sort

RETHINKING INTERACTION

BERNERS-LEE: I don't want to express something until I can do it with a keyboard, because I'm used to putting it in a random order and writing hypertext and jumping backward and forward, and I've started to lose the art of serialization. But when I try to get the hang of how ideas interrelate or draw a big plan, then I reach for a piece of paper that's as large as my desk. I spread it out. I get out a pencil and draw circles and arrows. It's the only way I can really put down all the interrelationships. And I don't have any application that could give me the ease of being able to see a 4-foot piece of paper at a glance.

ANDREESSEN: The big opportunity is to give everyone access to the Net over the normal analog phone connection without requiring a keyboard or device of any kind — just let you do whatever it is you need to do through a basic voice interface from anywhere. The interesting thing about that is it puts all the voice-recognition capability up in the network, not in the device.

CERF: One of the worst things about voice-response units is that you are forced to go through a menu of choices because you can't drive the system toward where you want to go very effectively. But if we had enough speech understanding, it would make all that information much more readily accessible.

BERNERS-LEE: We have to realize that when we talk to our machines, we're moving from the drag-and-drop world in which there's very little you have to remember about where you were. [With speech,] we're moving back to a conversational mode. That style of interface is very different, so it's, for example, difficult to take something that looks like a file system or menu system or Web site and turn it into something that will converse with you. So the art of engineering a conversational interface is something that we've got to learn a lot about. □

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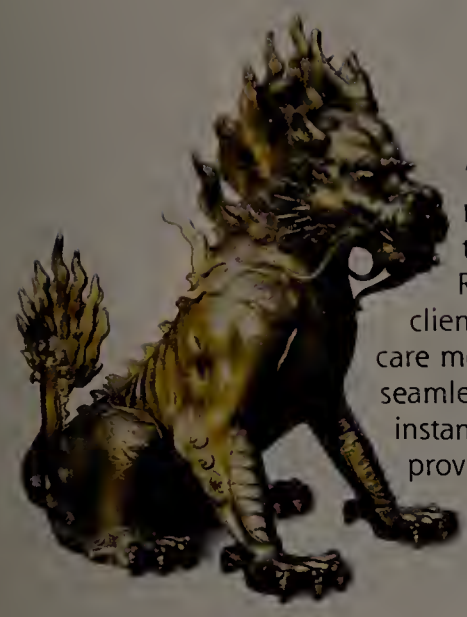

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'I'M NOT A VISIONARY'

MAYBE NOT, BUT SUN'S SCOTT McNEALY envisions an era of no computers but rather dozens of "Web-aware appliances" that will surround and support nearly every aspect of our lives.

"My first disclaimer is that I'm not a visionary," says McNealy, chairman and CEO of Sun Microsystems Inc. "I spend most of my time trying to get people [in the Fortune 500] to understand what technology is available to them today. I tell everybody, 'You're hopelessly behind taking advantage of network-based computing, of Internet protocols, of the new, Web-based technology.' "

Never one to mince words, the 44-year-old Midwesterner who co-founded Sun 16 years ago owes some small measure of his fame to his contrarian-but-entertaining opinions about the PC industry in general and his nemesis, Microsoft Corp., in particular. But the future of Sun has always been — and continues to be — a bet boldly placed on its slogan, "The network is the computer."

In this interview with *Computerworld* executive editor Maryfran Johnson, McNealy explains how the future he envisions holds no significant role for the PC.

CW: What kind of role do you see computers playing 10 years from now?

McNEALY: The concept of a computer goes away. It will become as uncommon a word in our vocabulary as a telephone switch or a power plant or a transformer. These are not words you use in everyday language. That's infrastructure. Computers will be in the server

CONTINUED ON PAGE 20

SCOTT McNEALY

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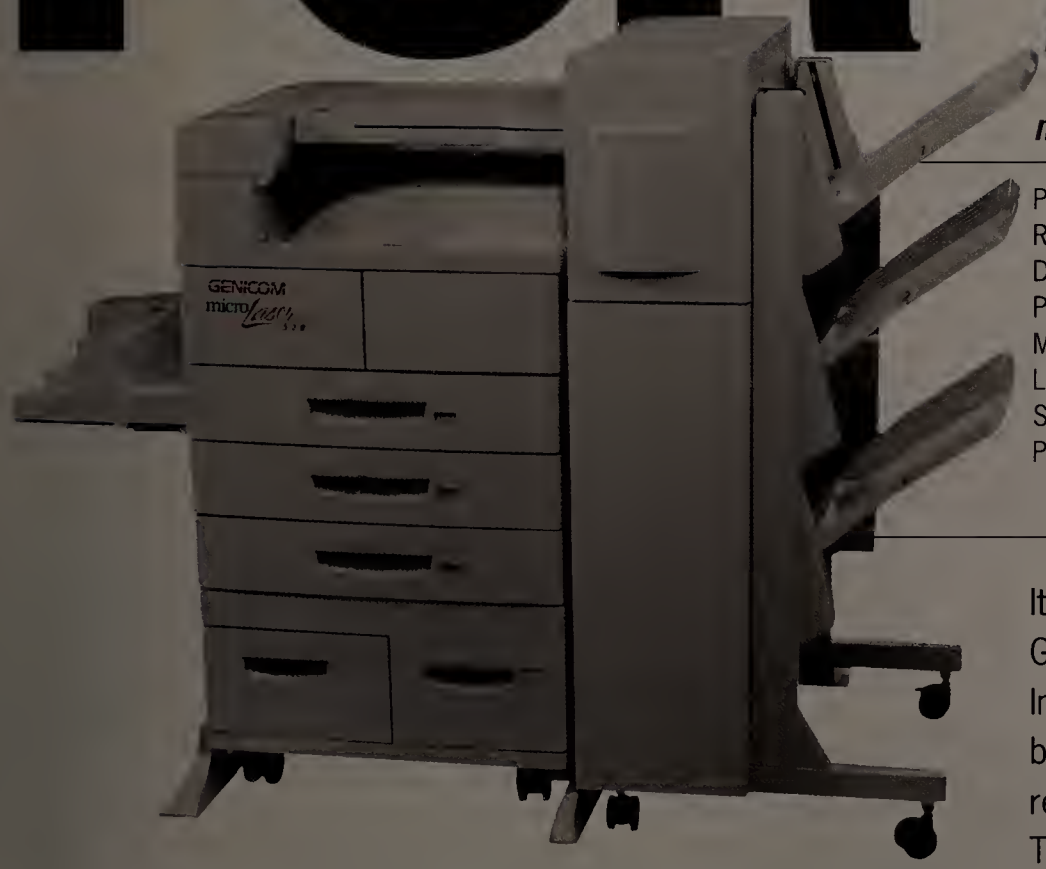

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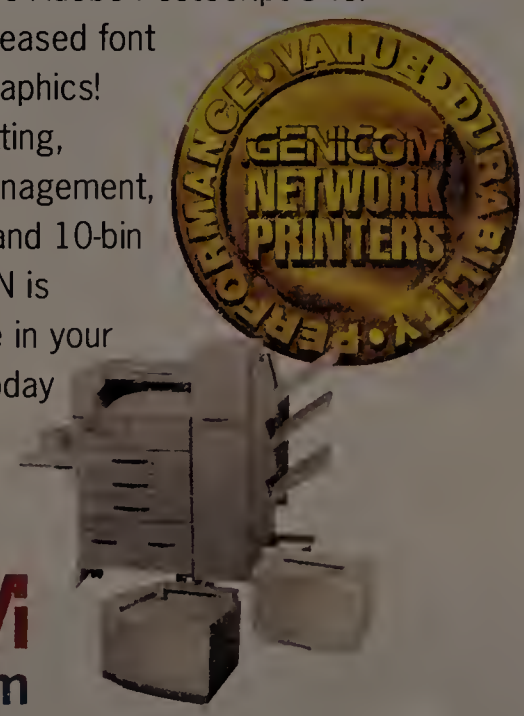

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"IF THERE'S A SENSOR AND A CAMERA IN MY BATHROOM, I WOULD HAVE A BIG PROBLEM WITH THAT! BUT IF THEY HAVE, IN PALO ALTO SQUARE, A CAMERA WATCHING 24 HOURS A DAY IN A PUBLIC PLACE — I CONSIDER THAT A LIBERATING THING."

CONTINUED FROM PAGE 18

room. Everything else will be an appliance, which is network-aware and network-capable and network-connected.

CW: Does anything about that scenario seem, well, creepy to you? Will we get to the point where there's no information that's private anymore?
McNEALY: Well, if they've got a sensor and a camera in my bathroom, I would have a big problem with that! But if they have, in Palo Alto Square, a camera watching 24 hours a day in a public place? No, I consider that a liberating thing. Now there's a chance that if anybody does something bad to me, they're going to be recorded and caught.

CW: What will the PC of the future resemble?
McNEALY: There's no such thing as a personal computer in the future. There are only available appliances. You'll use your smart card or your smart ring or some sort of proximity device, so that as you get near it, the device knows who you are, what you're authorized to access — and you type in your password to get to whatever service you paid for.

CW: So how will we interact with these devices? What kind of interface do you envision?
McNEALY: The idea that you have a computer interface is just wrong. You'll have appliance interfaces. A computer interface is some random thing invented by the folks up in Redmond. You're presuming that in 10 years we all still want to have our own personal mainframe under our arm or on our desktop, that we'll even want to carry 40 million lines of code around.

CW: Will we still be using keyboards? Or will we be speaking to these devices?
McNEALY: I don't know that speech technology is actually going to be more valuable than having the availability to just punch buttons. The whole concept behind our Jini [Java-based networking] technology is that the whole user interface comes with the device — as a Java applet that you can download to a variety of devices. Take this chameleonlike device called the PalmPilot, for example. You carry it around with you, and when you want to do the TV, you hit a button and it becomes the remote control; or when you want to make a phone call, it becomes a phone device.

CW: But with Java and Jini figuring so heavily in this future, you're talking about technology Sun owns and controls. Are you envisioning yourselves as the IBM or the Microsoft of the next millennium?
McNEALY: You're asking the CEO of Sun where he thinks the world is going. If he thinks the world is going to go in a different direction than where he's taking his company, somebody ought to fire him! Just go back 15 years or even 10 and we were saying, "The network is the computer," and people looked at us like, "What are you talking about?" Now everybody gets it.

CW: What are some of the future uses you see for the Internet?
McNEALY: I think the Net will continue to provide every media type you can think about. There will be a standardization for audio, video, messaging, file, print, fax, voice recognition, compression, security — all of those kinds of things. As we move forward, I don't know that any one will matter more than the others. I can tell you that people will be doing ASCII E-mail forever, though, because it's easy and it's simple.

CW: Where are the growth opportunities in this future?
McNEALY: The growth will come from a lot of little companies and some big companies that have a tradition and a mode of operation that actually allows for innovation. All of a sudden, it's zero cost of goods sold and zero publishing costs for software, so innovation can come from any genius anywhere at any time. Look at what Linus Torvalds has been able to do [with Linux, the freeware version of Unix]. There's a whole range of products out there the world needs. I think a lot of innovation happens there.

CW: In the next decade, how much computing power will $100 buy?
McNEALY: None. I'd put it all into the display, because that would be the porthole to the network, where all the computing power lies. In the future, am I going to buy a computer? No. Corporations will stop buying computers. They'll start leasing access to these computing environments. Consider how, today, there is phone access built in to all kinds of devices. Your car has a portable phone. When you swipe your Visa card, you're going out over the phone line. In the Web-tone world, there will be just such a network, where you have all of these IP services out there on the network, accessible from every kind of client-side device. You don't buy a computer. You buy a phone that can access IP services.

CW: With these self-sustaining networks you envision, it sounds like a lot fewer jobs for information technology professionals.
McNEALY: Probably. As we move technologies into the service providers and start providing application tone, Web tone, data tone and E-commerce tone, the need for a value-added reseller to help all these individual companies goes away. There will be a couple of mail providers to the service providers, a couple of news providers, a couple of Web site providers.

CW: So you see an enormous shrinkage from the size of today's computer industry?
McNEALY: No, I see an enormous shrinkage in the size of our competitors [laughs]. See? I'm being a visionary! □

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Agent Secrets

PATTIE MAES IS AN ASSOCIATE PROFESSOR at the MIT Media Lab, where she started the software agents effort seven years ago.

She also was a founder of Firefly Network Inc. in Cambridge, Mass., one of the first companies to commercialize software agent technology. (Microsoft acquired Firefly in April 1998.) Maes, 37, is on a yearlong sabbatical to think about what area(s) she would next like to pursue professionally. She continues to believe agents can change lives, but her thinking on exactly what those agents should do has changed. Maes spoke with Computerworld *online editor Johanna Ambrosio about the role of agents in the coming decade.*

I'm not necessarily trying to make agents more intelligent. It's important that people can predict what they can expect from their agent. Expectations need to be set correctly, and it's easier to do that if the agents are simpler. For example, take agents that buy and sell on behalf of people. Initially, we experimented with fairly sophisticated algorithms that would allow agents to determine the optimum price. But people didn't feel comfortable delegating that to an agent. So we've made it very straightforward.

In Kasbah [MIT's prototype agent-based electronic marketplace], you tell your agent what you want to sell, how long it should be on the market, the price you're willing to accept or offer. People trust that kind of agent because they know what its behavior will be like.

Whenever we automate part of our lives, we lose something, possibly the ability to deal with that part of our lives ourselves. Agents aren't meant to completely automate all tasks. It's important that people still take responsibility.

Initially, I thought that software must take a larger and more active role in our lives to work on our behalf — to help make our lives easier, less complex, make more time for doing the things we enjoy. But since the advent of the Web, I've started realizing that we don't always have to use software to augment ourselves. We can actually enlist the help of other people. You could almost argue that we don't have to build artificially intelligent computers anymore because the Net is our AI computer.

If I have a detailed question, I can just go to the right newsgroup and get the answer right away. This is the "community-ware" idea — using computers and the Internet to help people help each other. And this will be especially true as more people are online.

THE PEOPLE CONNECTION

People can help other people, especially the underprivileged. For example, lots of people have been working on natural language translation systems with moderate success. But there are so many people in the world who speak more than one language. What if we could use the Internet to locate another person who could help with a particular translation at a particular time?

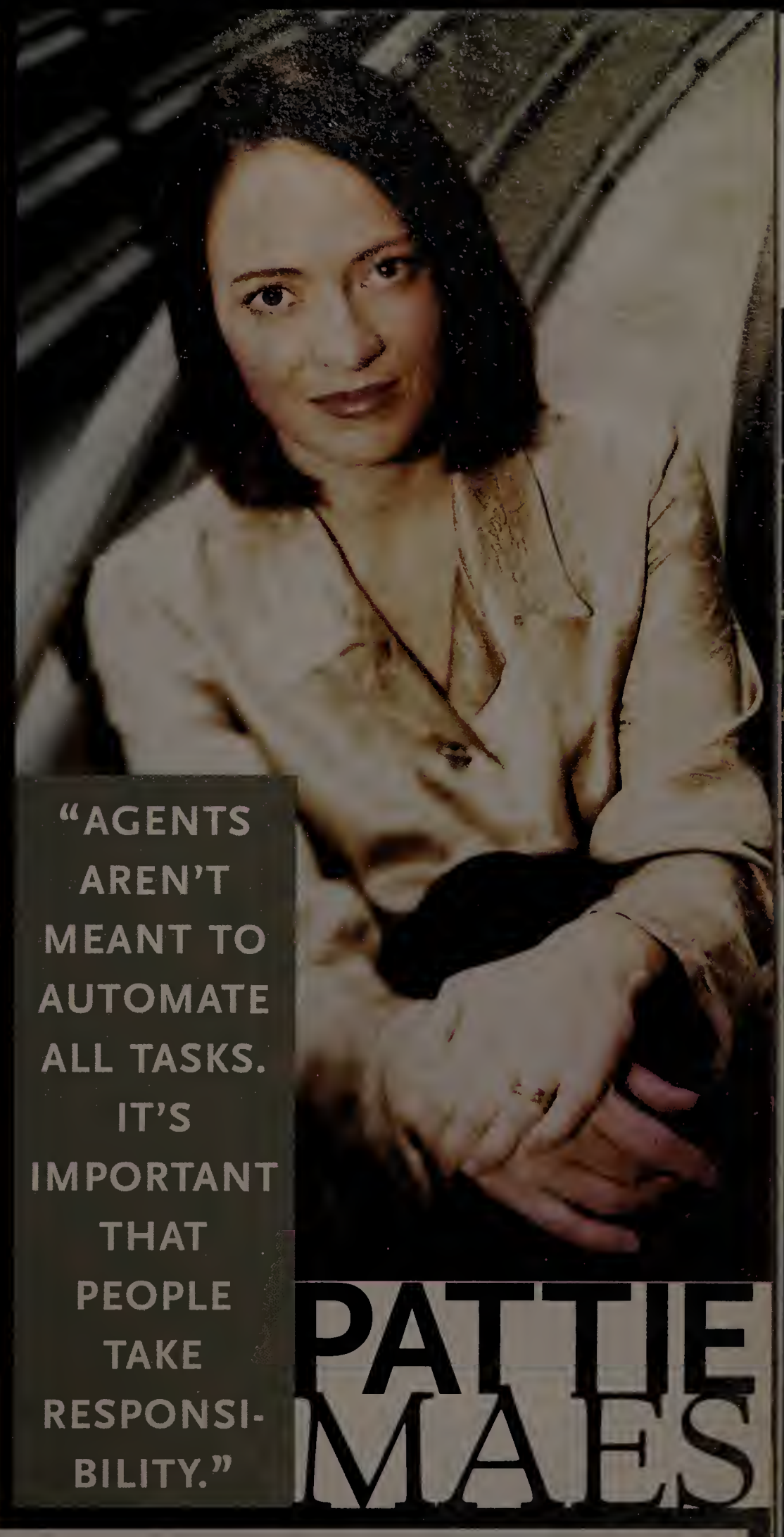
Let's say I'm on vacation in Italy, that I'm shopping but don't speak Italian. I find something I really want to buy, and I need to talk with the merchant. I use my portable computing device to request that my agent go and find a human who can help me for five minutes, that I'm willing to spend $5 a minute on this service, that the person's grasp of English needs to be modest, their reputation reasonable but not necessarily excellent.

So in a fraction of a second, my agent has negotiated with the agents of people who provide translation services and has gotten me the best deal available at the time. The translator calls or becomes available online, and we go from there.

There will be more opportunity to transform, really revolutionize, the transactions online. Software will help you decide which merchant you are going to buy from, which products best fit your needs, and will help you negotiate the terms.

You could have software that monitors copier paper at the MIT Media Lab and decides when more is needed. The agent would go to an electronic exchange for copier paper and make choices based on the particular needs of the Media Lab. If the paper supply is very low, maybe the agent would pay more for a supplier willing to deliver the next day.

We have identified a range of ways agents can make our lives easier. A lot of these ways correspond to things that people are just naturally not very good at — dealing with large quantities of information or remembering things. So agents can make a big difference. □



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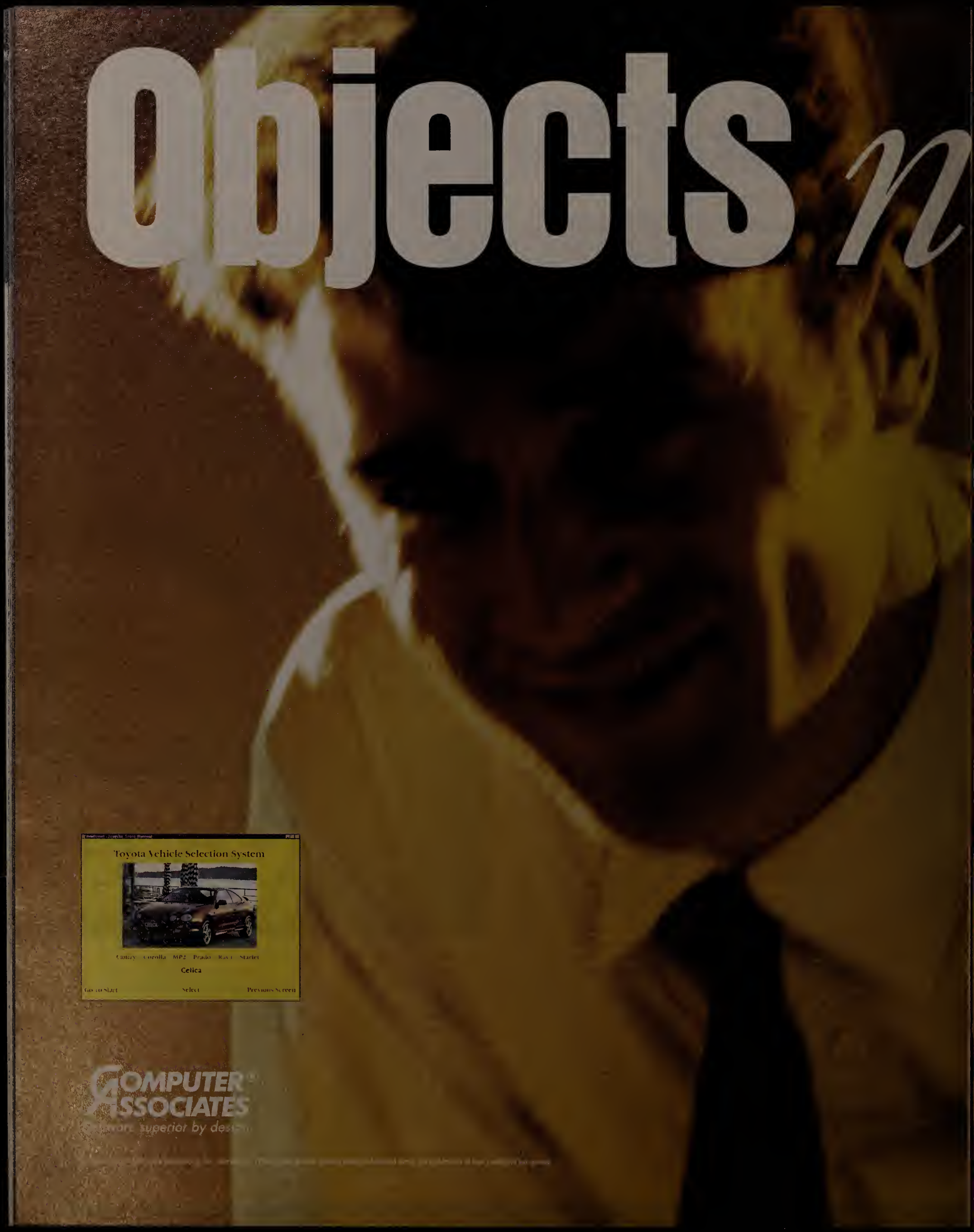
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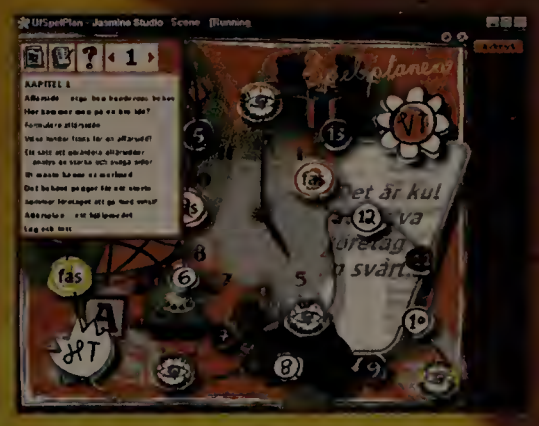

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Introducing Jasmine

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Future So Bright

YOU'VE HEARD OF THINGS THAT GO BUMP IN THE NIGHT.

What about cyberthings that go bump on the Net? Salman A. Khan, 22, envisions a society in which cybersearch agents — personalized piles of code — will transact our business, serve as our proxies and possibly even live on when we pass.

Khan was president of MIT's class of 1998 and now is a product manager for Oracle Corp.'s Oracle8 database. He also is co-founder of Ilzo.com, a start-up that seeks "to pioneer the use of locally scoped domain names." Khan spoke with Computerworld *senior writer Roberta Fusaro about his view of computers in the next 10 years.*

"[Physically], computers 10 years from now will probably not be all that different, and they are already getting cheaper to own. But what they will allow us to do will be altogether revolutionary. More than the physical computer, it's the global web of information that we know as the Internet that will really change our lives.

"The current World Wide Web is just scratching the surface in terms of the power of the Internet.

"Right now, we have only mapped conventional [tasks] to electronic ones. For example, you once went to an ATM to make a transaction from your bank account. Now you sit in your office and [conduct] the transaction [by accessing] your bank's Web site. You once went to the library to look up information. Now you do a Web search.

"What we will see over the next 10 years are new ways of transacting business and personal affairs and entirely new things to do over the Internet," Khan says.

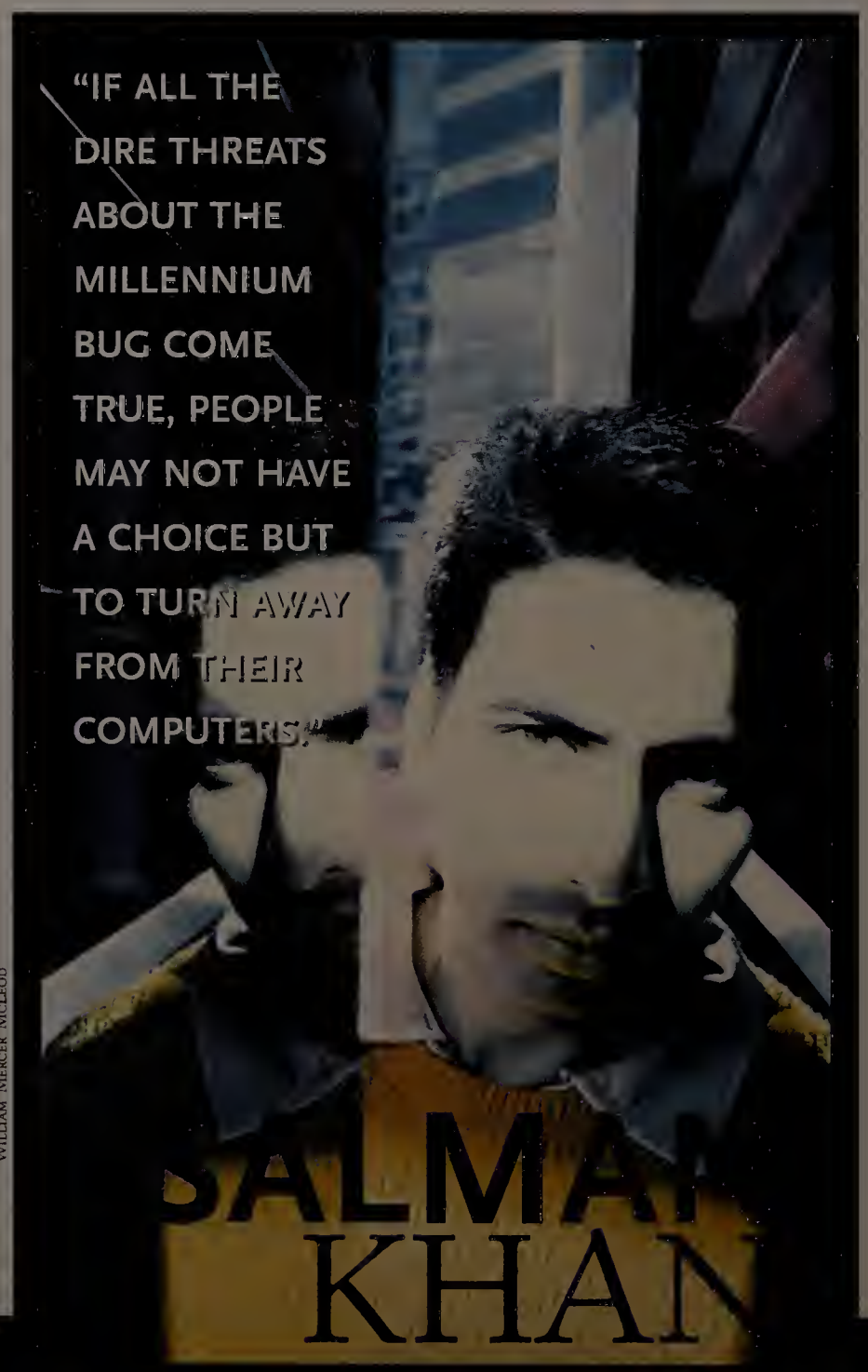
"Everyone will be represented on the Internet by static data as well as dynamic processes — stuff that is far more extensive and powerful than information such as name, sex, race, age, interests and so on. This information could potentially be a nearly complete description of who you are and how you think.

"An analogy in today's terms would be your credit rating. It gives potential creditors an idea of the likelihood of your paying off your debts. Now imagine if that information were extended to represent your political views, your spending habits, who you spend your time with — not to mention a complete physical description of you."

That would allow for perfect marketing. "You wouldn't mind seeing ads, because they would be ads for things you were [already] thinking about buying and would probably [anticipate and answer] all the questions you have about the product."

Along the same line of reasoning, the data could be used to dynamically produce personalized text or video. "Imagine, for example, news that fills in any background information that you don't know, or a science text that is written at exactly your level of understanding.

"This concept of data representation can be extended even further to active data [or a software-based proxy] that could act on your behalf. In 10 years, you may have agents that roam the Web and perform transactions as you would have performed them yourself. Since these agents would conceivably have your tastes and spending habits, they could conceivably try on and purchase clothing for you."



William Mercer McLeod

CAST A VOTE

That could extend to the voting booth, Khan says. "I definitely see a future for electronic voting. You can program [your proxy agent] to vote for you. For instance, you could say, 'Vote for the person who agrees with me on most of these points.' . . . And then we'll get the turnouts we need [on Election Day]."

And Khan says he can imagine a person dying but having his or her agent live on in cyberspace. "It's a very interesting concept, that you and the information that defines you will become blurred," he says.

But that won't scare people away from their PC terminals or set-top boxes. "Of course, if all the dire threats about the millennium bug come true, people may not have a choice but to turn away from their computers," Khan says with a laugh.

Khan also sees the development of megamergers — or megabattles — among those who provide content over the network and those who provide the infrastructure. Just as Microsoft and NBC created MSNBC, we'll see more media/computing conglomerates, he says.

He sees a big dogmatic shift in electronic commerce: the notion of micropayments. He says that if you're able to charge one-tenth of a penny in the virtual world, you can open up whole markets.

"For instance, you're a poet. You can sell your poem on the Web for one-tenth of a cent. People won't pay $1 for a poem, but they'll pay less than a cent. There are things in the world that are worth less than a penny, but in the real world we don't pay attention to that because we can't charge less than a penny. [In the cyberrealm], you could conceivably have some 9-year-old who is the best Super Mario Brothers player, and he'll have a Web page and charge a half-cent to all the kids who want game tips and hit the site. And he could potentially be a millionaire."

Digital watermarking would allow this paradigm to succeed. "The main argument against this model is that someone else could take [your] poem and stick it on their Web site and charge the same amount. But a digital watermark [or legal identifier] would track the information, and you could sue if that was the case."

Society must answer some very serious questions as to what the role of computers will be in our lives, Khan says.

"For example, there is a very fine line between utilizing the power of computing to benefit our lives and becoming so dependent on computers that we lose much of our humanity. The same technology which can be used to produce personalized information could be used by governments to bring about an Orwellian state.

"This issue — possibly the single most important issue ever — will start to show its face in about 10 years," Khan says.

And where will Khan be in the next decade? "Visionary consultant?" he asks with a chuckle. "I don't know, this could be the beginning." □

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BILL GATES

"YOU WON'T EVEN THINK YOU'LL JUST KNOW THAT

Pure Digital

In his 1995 book, The Road Ahead, *Microsoft Chairman and CEO Bill Gates forecast a future in which PCs are ubiquitous, with data synchronized and available on all kinds of devices whenever we need it.*

Although Gates' basic message has remained unchanged, the commercialization of the Internet has introduced a new variable: the potential of information technology to restructure many businesses.

When he sat down with Computerworld *editor in chief Paul Gillin at the Comdex/Fall '98 trade show in Las Vegas in November, Gates' fundamental message was familiar: The best is yet to come.*

People overestimate what will happen in two years and underestimate what will happen in 10.

As far as the PC is concerned, we haven't seen anything yet. In 10 years, it will be a small, tablet-like screen that you carry around. Or it'll be on the surface of your desk where you can see lots of documents. If we get it right, even the notion of filing things away as with a paper document will be antiquated. Today, even those of us who embrace technology still put a lot of things on paper. Eventually, hardware and software advances make everything digital.

There will be a variety of PC form factors. Even the full-screen user will have a number of computers sharing data and connected to the Internet. You won't have to think about moving data around; your schedule and files will just show up.

Ten years from now, I believe that books and music and photos will have moved to pure digital form. The whole chain from the book author to the reader will become digital. People will be amazed when they have to use a paper form. They will take working through a screen for granted. I'll put my reputation on the line that this 10 years is when [paper forms will almost disappear].

There will be a device for knowledge workers that will have an incredible processor that responds to you immediately. You'll take the device to meetings, and all the information you want will just be there.

You won't even think about where information really is. You'll just know that when you go to your home machine or your work machine, the files are there. The machine will be replicating information, and when you update it, the information will go up into a cloud and come down on other machines. Logically, the information will be in the cloud, but data will come to your machine, and the actual applications will be there.

Storage management will be invisible. The operating systems will do authentication and speech recognition and bring the files down. But you won't know where the server is.

The great debate is about which sectors of business will

ABOUT WHERE INFORMATION IS. THE FILES ARE THERE."

STEVEN BORNS

be most transformed. Where does the advantage of broad price selection and comparison-shopping of the Web outweigh the traditional personal contact in selling? Today, there are three selling worlds: face-to-face, phone and Web. The phone and the Web won't be separate in the future because you'll have the ability to talk to somebody from a Web site if you want to do a transaction. And they'll have the full context of what you're looking at and what your customer history is. Everybody will take that for granted.

But different goods will be affected at different rates. The way we shop for clothes may never change, but it'll be different because we'll have our measurements stored centrally, or we'll have hybrid pricing models. Books are a fascinating example. When I buy books occasionally, I do it online. But when I want to buy a whole bunch of books, I still go to the bookstore. I like to run into things, scan the sections. That whole scanning activity is still weak on the computer.

[Electronic commerce gets overhyped today]. There's nothing dramatic about the fact that an order that used to come on paper now comes on the Internet. All you did was change the medium. What's profound is when buyers and sellers who never would have been matched before are being matched.

If I go to the car lot and I'm a lot smarter about what I'm buying as a result of doing research on the Internet, that wasn't an electronic transaction. But the whole dynamic was completely changed by the wide availability of electronic information.

Say you want to buy a novel gift. It's hard today. But what if I can find somebody on the Internet who helps find novel gifts for me, gets my criteria, sends back some suggestions, and we go back and forth? The physical world doesn't do that very well.

Certain industries will restructure. The average company will become smaller, because the ability to work with outside partners will improve. You'll keep your core competencies in-house, but a lot of things will be outsourced. Your accountant, for example, will be able to come in electronically and see if you're doing things right. You might not choose to have an accountant in-house. But people who run restaurants, drill for oil or plant seeds — they'll still be there. Their value isn't affected that much.

In the computer industry, size and influence will be less correlated. Dell represents specialization. They use information to reduce inventory to a minimum. They are ideally suited to Internet commerce.

Ten years from now, there will be a leader in each category of the computer industry, but there's no guarantee there will be the same companies. You will get more specialization as the industry gets bigger.

The disparities between haves and have-nots [in society] are pretty dramatic and have been for hundreds of years. There is a chance to do far better than that. You'd like everybody to have access to these wonderful advances. But when you get outside the U.S., the priorities are a little different. You want to get people medicine and books and a phone. We can't stop progress and wait for everybody to catch up. And as computers create better crops and new medicines, they are creating better things for the whole planet, even though the tools take longer to get into everybody's hands. □

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ANN WINBLAD, 47, ISN'T YOUR TYPICAL VENTURE CAPITALIST. With more than 20 years in the software industry, she has done it all: programming, consulting, launching and selling her own software company, writing books and making millions.

Into Thin Air

In 1989, the Minnesota native started Hummer Winblad Venture Partners with former professional basketball player John Hummer. Today, their San Francisco-based company manages about $200 million in high-tech investments, all of it in the software industry. Most of the companies she targets are created and exist in thin air. That is, they're on the Internet, the only true trading floor in the emerging information economy. Winblad tells Computerworld *senior editor Julia King about the next decade of computing:*

"WE'LL SEE A CHANGE FROM AUTOMATING PROCESSES TO CHANGING THE PROCESSES THEMSELVES."

As we enter the next millennium, rather than automating processes, companies are looking at who even belongs in the process. We'll see a change from automating processes to changing the processes themselves.

The upshot will be a radical reconfiguration of supply chains, which already is under way, thanks to companies such as online bookseller Amazon.com Inc. and Dell Computer Corp., which Winblad calls "guiding lights" in the effort to "leverage bits vs. atoms."

Amazon.com collects capital before it expends capital to get its products to customers. By comparison, Barnes & Noble's retail outlets effectively amount to 1,000 warehouses where it has to display its books and products.

Barnes & Noble can't take a wrecking ball to that. So what do they do? They announce they'll acquire Ingram Books, which supplies 59% of Amazon's books. That's like if Dell got so far ahead of the competition that Gateway decided to buy Intel. It's a pretty dramatic step to stop the train, and most companies won't be able to acquire the supply chain.

What Dell has done is squeeze out the distance between its products and customers. And they've done it all through technology — and information — not by hiring people.

Which is what other companies — companies that can't afford to buy an entire supply chain — need to do fast if they're to succeed in the fast-blooming information economy.

Everyone has to look at the economics of their business. Companies also need to look at whether a capital-efficient company can come in and change the nature of a business, which is what Amazon.com did.

As we move ahead, investors are scrutinizing large industries and large industry segments for places to leverage bits vs. atoms. Wedding services, for example, are very disaggregated. There's no leader in wedding services.

No surprise, then, that Winblad's company has funded a new Net-based company called The Knot. Other Winblad-backed ventures include National Transportation Exchange, an online service that matches cargo with trucks, and IMX, a Net-based mortgage exchange between brokers and bankers.

As supply chains and processes change, we'll also see an emergence of more data sources. Now, each company has vats and vats of their own data. In the future, companies may purchase customer history databases, for example, and they'll have better analytical tools.

Evidence of this trend is already piling up.

You're seeing people give high valuations to Internet companies that aren't even selling goods and services, but they're huge repositories of information. It's information that becomes their leverage over time.

The information economy also will shake things up in the executive suite.

We'll see the roles of CIOs and CFOs converge. The information officer will become the information economist in these companies.

Big changes are also on the horizon at home, where computing will extend well beyond PCs and the Internet.

The price/performance of storage technology has changed dramatically, which allows us to think about lots of consumer appliances — even our CD players and digital VCRs — as computing devices. There will be many different things we can send data to, store data on and retrieve data from. Even though progress is slow, we're also increasing bandwidth, so if we look at a 10-year time frame, we can look at always being on the network. We will not be dialing in and waiting for things, but we'll have instant access.

I think $100 will buy plenty of ability to access information online. Most likely, the cost will not be in the [information retrieval and storage] device. The cost will be for the subscription to access information that is crunched somewhere else. People will come to think of the computer not as a productivity device, but a communication portal, knowing they can always reach in and get what they want.

A lot of the innovation that happens for the [home] consumer will then come back to business.

Again, Amazon.com springs to mind.

Now, if you're at the Amazon.com site and the phone rings and you forget where you were, you can hit the recommendation engine button that's running a real-time statistical model against the purchasing database of yourself and others.

Once we improve technologies that let consumers connect their desires to products, we can then bring them back to business. The whole way we're doing personalization on the Internet for consumer-driven commerce will translate to better business-to-business transactions. □

William Mercer McLeod

THE FORTUNE 100: 1 General Motors 2 Ford Motor 3 Exxon 4 Wal-Mart Stores 5 General Electric 6 International Business Machines 7 Chrysler 8 Mobil 9 Philip Morris 10 AT&T 11 Boeing 12 Texaco 13 State Farm Insurance Cos. 14 Hewlett-Packard 15 E.I. du Pont de Nemours 16 Sears Roebuck 17 Travelers Group 18 Prudential Ins. Co. of America 19 Chevron 20 Procter & Gamble 21 Citicorp 22 Amoco 23 Kmart 24 Merrill Lynch 25 J.C. Penney 26 American International Group 27 Chase Manhattan Corp. 28 Bell Atlantic 29 Motorola 30 TIAA-CREF 31 PepsiCo 32 Lockheed Martin 33 Fannie Mae 34 Dayton Hudson 35 Morgan Stanley Dean Witter Discover 36 Kroger 37 Lucent Technologies 38 Intel 39 Allstate 40 SBC Communications 41 United Technologies 42 Compaq Computer 43 Metropolitan Life Insurance 44 Home Depot 45 ConAgra 46 Merck 47 BankAmerica Corp. 48 GTE 49 Johnson & Johnson 50 Safeway 51 Walt Disney 52 United Parcel Service 53 Costco 54 NationsBank Corp. 55 USX 56 BellSouth 57 Enron 58 International Paper 59 Cigna 60 Dow Chemical 61 Sara Lee 62 MCI Communications 63 Loews 64 Atlantic Richfield 65 American Stores 66 Caterpillar 67 New York Life Insurance 68 Coca-Cola 69 Columbia/HCA Healthcare 70 AMR 71 Aetna 72 Xerox 73 American Express 74 J.P. Morgan & Co. 75 UAL 76 RJR Nabisco Holdings 77 Lehman Brothers Holdings 78 Bristol-Myers Squibb 79 Ingram Micro 80 Supervalu 81 Duke Energy 82 Ameritech 83 Federated Department Stores 84 Phillips Petroleum 85 PG&E Corp. 86 Fleming 87 US West. 88 Electronic Data Systems 89 Minnesota Mining & Mfg.90 Sprint 91 Eastman Kodak 92 Albertson's 93 AlliedSignal 94 Sysco 95 Federal Home Loan Mortgage 96 First Union Corp. 97 Fluor 98 American Home Products 99 Archer Daniels Midland 100 Raytheon

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Revolution in Waiting

JEOF SPIRO

"I ONCE COMPARED THE LINKING OF TWO COMPUTERS OVER A PHONE LINE TO TWO PEOPLE TRYING TO MAKE LOVE THROUGH THE MEDIUM OF THE POST OFFICE."

LEWIS M. BRANSCOMB sits at the intersection — indeed, at the apex — of business, technology and public policy. At 72, he is professor emeritus of public policy and corporate management at Harvard University's Kennedy School of Government and director emeritus of the Science, Technology and Public Policy Program in the school's Center for Science and International Affairs. He also is principal investigator of the Harvard Information Infrastructure.

President Johnson named Branscomb to his Science Advisory Committee in 1964. Branscomb was a research physicist at the National Bureau of Standards and its director from 1969 to 1972. In 1972, he was named vice president and chief scientist at IBM. While at IBM, he was appointed by President Carter to the National Science Board and in 1980 was elected its chairman. He is a member of the National Academy of Engineering, the National Academy of Sciences and the National Academy of Public Administration. *Computerworld* senior editor Gary H. Anthes spoke with Branscomb about the next 10 years of computing.

CW: What changes are on the computing horizon?
BRANSCOMB: A lot of the changes will be unseen and as pedestrian as they are profound. Automobiles, already stuffed with computers, will be self-navigating, nonpolluting and collision-avoiding. Homes will have smart electrical systems that control the production and use of power, integrating the power-generating capacities of our cars into a single cogeneration facility that exchanges power with both neighbors and the public utility. Smart, noninvasive health-monitoring systems will bring telemedicine to the family, avoiding expensive, institutional health services by shifting expenses from the cure of disease to home-based health maintenance.

CW: How about the manner of communications?
BRANSCOMB: Computer communications has been around some 30 years, but for most of that time the speed with which information could be exchanged was so much slower than the internal speeds of processors that one could not realize the benefits of fully distributed intelligence. I once compared the linking of two computers over a phone line to two people trying to make love through the medium of the post office. But we will not have to wait 10 years for the disappearance of modems and their replacement by all-digital LANs in homes and offices, giving every computer access to at least Ethernet speeds.

Once high-speed communications is widely available, truly distributed computing becomes practical. Some kinds of information will be easier and more accurately obtained by reacquiring it in real time rather than relying on periodic data gathering and storage in files that get progressively more out of date. When the city planners want an accurate city map with all building locations, they may acquire and process the image of the city from a satellite rather than relying on municipal records replete with human error.

CW: How will these technologies change our lives?
BRANSCOMB: That depends more on political and social priorities and the effectiveness of institutions than on the technology. Government agencies could today provide each citizen full access to their records so they could verify them. But most agencies don't. Stores could make it as easy to buy a washing machine online as it is to buy a book, but most don't. None of this requires any new technology whatsoever. It only requires institutions to understand what their responsibilities and opportunities are and react correctly rather than defensively.

Education is the most challenging and important sphere for IT. But the effective use of computer communications in schools cannot happen unless the schools are reinvented and teachers have better training, more respect, more authority.

CW: Are there barriers to the progress you're describing?
BRANSCOMB: The most ardent conservatives violate their own principles by searching for ways for the government to intrude on private lives. Their motives are respectable: shielding children from shocking material, discouraging the diffusion of information useful to terrorists and drug addicts, allowing police to wiretap computer communications when they get a warrant to do so. But balancing the government's two primary duties — to protect our liberties from government abuse while using government power to protect our safety and security — has never been easy in a democracy.

CW: Will we get better at developing software?
BRANSCOMB: The financial incentives for technological progress have shifted from hardware to software. New ideas in software component technology are emerging — a variety of ideas stemming out of the object-oriented programming world, such as [Common Object Request Broker Architecture], Java-based ideas and others. I expect this to be a fruitful area of invention in the next five years, with some real payoffs within the next 10. When we achieve the dream of object-oriented software, the revolution will have arrived.

CW: Any risks in technology?
BRANSCOMB: If IT is used to trying to get ever-higher efficiency, there will be growing risk of catastrophe. Every tactic aimed at greater efficiency does so at the risk of more drastic, if less probable, instability. Ecologists learned this long ago: Replacing 75,000 natural varieties of rice or wheat with a dozen genetically optimized species increases production dramatically, but if a new plant disease hits one or two of these new species, the world may lose 10% of its food supply.

One of the most serious questions facing government today is how to decrease the vulnerability of today's economic infrastructure: transportation, communications, power production, delivery of health and business services. All are increasingly based on IT.

CW: So IT can be a threat. Can it also be a solution?
BRANSCOMB: IT is the one tool available to human society to permit us to design our socioeconomic systems so they are resilient against potential catastrophic change. Maximizing one dimension in a complex system is a relatively easy analytical problem. But understanding the dynamics of complex systems — whether ecological or socioeconomic — requires dealing with systems that are chaotic, nonlinear and often irreversible. □

LEWIS BRANSCOMB

"WE'LL SEE A CULTURE OF KIDS DOING PRETTY RADICAL THINGS WITH WIRELESS DEVICES, [INCLUDING] HAVING THEM EMBEDDED IN THEIR BODIES."

JOHN RAE

JARON LANIER

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MOST CONSIDER HIM TO BE THE FATHER OF VIRTUAL REALITY. Before his 34th birthday, Jaron Lanier had invented the dataglove and the eyephone. Now 38, he's likely to be found consulting to a Fortune 500 company or jamming with musicians (in virtual reality, of course). Lanier now serves as the lead scientist at the National Tele-immersion Initiative, a coalition of research universities studying advanced applications for Internet 2. Sun Microsystems Inc. recently acquired Lanier's portfolio of patents related to virtual reality and networked three-dimensional graphics. Lanier talked with *Computerworld* senior editor Barb Cole-Gomolski about what the next 10 years of computing will be like in the real world.

CW: What role will computers play in our home and at work?
LANIER: I think the big transformation in the role of computers is going to be that they will move from being a personal tool to an interpersonal tool. We see that already with E-mail and E-commerce. But we'll see it on a more profound level. Really intimate and personal aspects of people's lives will happen over the medium. Parents and children will be able to stay in touch in a way that is not possible today. The heart of this [issue] is not technological. It's more about how humans will behave when they have new options.

CW: What will computers look like? What will the PC of the future resemble?
LANIER: I'm predicting a lot less innovation than I'd like there to be. We're talking monitor and a keyboard as an input device. It's a legacy system, and we're stuck with it. I don't see pen-based [models], except in niches. Voice recognition will be standard. Clearly, there'll be a camera, and it won't just be used for videoconferencing. It will be used to confirm the identity of the user and monitor job performance.

We'll see a culture of kids doing pretty radical things with wireless devices, [including] having them embedded in their bodies. There are some other dark horses, things like interfaces in automobiles. In terms of mainstream use, the most convenient device might be some little display that's near your eye and some kind of device that rests on your chest. The other big area will be the convergence of computers, phones and TVs. From the business perspective, the really big issue will be cost management. I think we're going to see a lot of pressure not so much on the cost of computer equipment, but on the overall true cost [to run it].

CW: How will we interact with our computers? What will interfaces look like?
LANIER: I hate to say it, but unless something happens to Microsoft, they'll look the way Microsoft wants [them] to. I don't think they're very good at user interfaces. It will have to keep changing somewhat, so they can get people to buy upgrades. [Microsoft] seems to have a penchant for these little animated figures that treat the user like a moron. I would expect to see a lot of these really dumb, smiley-face interfaces that patronize the user.

In terms of wireless devices, there's a lot of hope for interesting user interfaces. For instance, every conceivable surface could be a display. Instead of putting up wallpaper, you put in a display. Instead of putting down a rug, you put down a display. I think virtual reality will play a role in many ways. We'll see more [of it] in business applications.

CW: What will the Internet be used for?
LANIER: That's like asking what will water be used for. It should be thought of much more broadly. Water is used in a million ways. I think that's how the Internet will be: a general-purpose utility provided by public and private means. It will become very cheap.

CW: How will computing change our concepts of community? Of workplace? How important will computers be to finance and government in 10 years?
LANIER: Society will be revealed to a much greater extent. In its worst face, it's a lack of discretion. At its best, it's an increase in honesty. People knew how to lie before the Net. The Internet is a technology. I'm an optimist, so I believe that while the Internet allows people to do more things, there will be more jerks. There will be more pedophiles and pyramid schemes — but also more good. We'll see a more visual Internet, where we are looking at someone's face. We will vote on the Net, but we won't be the first country to do it.

CW: How will computers affect the way we transact business with customers and business partners? What new applications haven't been developed yet?
LANIER: For one thing, I think we've been in an era of data mining as a paradigm. We create databases of customers, target and sell to them. The new hot commodities are portals and databases. I predict that those things won't meet expectations. What will emerge is a more subtle and superior model of how IS can improve customer relationships. Rather than targeting the customer, they should turn their [Web site] into a video game that the customer wants to play. If businesses do this, they will make more money.

As far as business to business, there will be more and more recognition that in order for IT systems to be successful, they have to be built around specific people. The really high-performance systems — like one for a fighter pilot — are built this way. Today, businesses are designed around IT. I think you'll see an IT environment specific to [human resources] and one that is specific to quality control. It will be much more human-centric. Wealth is created by people, not computers.

CW: How much computing power will $100 buy in 10 years?
LANIER: Right now, for $100, you can buy a Nintendo 64, an incredibly impressive computer. In 10 years, you will probably be able to buy something utterly stupendous. But that doesn't excite me if all it does is run the same software a million times faster. □

Trail

MIKE HESCHEL,

57, put the pioneering ASAP ordering system in his customers' hands as CIO at American Hospital Supply and made waves as it knocked out the competition. He now works in Cincinnati as executive vice president of information systems and corporate services at supermarket chain Kroger Co.

CHARLIE FELD

showed how salespeople armed with handheld computers could streamline the sales process and create marketing data. That was when he was vice president of IS at Frito-Lay Inc. in the 1980s. Now, at 56, Feld is CIO at Delta Air Lines and president of Feld Group, a CIO-for-hire company.

MAX D. HOPPER

revolutionized the airline industry by developing American Airlines' Sabre reservation system. Then he turned that system into a business as chairman of Sabre Group before retiring in 1995. Now 64, he consults out of Dallas.

KENT BARTON

Blazers

WE ASKED THESE THREE LEGENDARY CIOS

how companies can use technology to compete in the next 10 years and what the next decade will mean for information technology. Allan E. Alter, *Computerworld*'s department editor, Managing, led the discussion and prepared this edited version of the conversation.

CW: How can companies use the Internet to achieve sustained growth and profitability?

HESCHEL: You have to view the Internet as a networking capability that gets you anywhere, anybody, anytime. What do you want to make available so you can offer services that enhance your business relationships and drive sales?

HOPPER: We have a fairly primitive form of the Internet now. As the bandwidth comes along to make it work well, it's going to supplant an awful lot of how the world works today. For example, people like Mike will move to revenue maximization techniques such as flexible pricing. The Internet will become a distribution channel for almost any merchandise.

FELD: We see it in the airline business. It's part of the strategy to reach more people for travel services. My kids are in their late 20s and early 30s, and they live on the Net. They wouldn't think of buying a ticket any other way. The combination of improving technology and the next generation's purchasing power is tremendously powerful. As the Net matures and 15-year-olds become 20-year-olds and start spending money, it'll be huge.

CW: How will IT leadership change?

FELD: IT leadership will include not just CIOs or their direct reports, but the CEO and his direct reports. The whole human side of IT will have to change because the development cycle is too long. That will push us to more cooperative work, more partnerships and quicker ways to get things done.

HESCHEL: The CIO will have to have much faster cycle development times, to get visibly quicker results. What's critical is to take key performance indicators — sales and inventory levels, bottom line, employee turnover — tie them to the systems you have or are developing and communicate those results to the business partners.

HOPPER: The CIO of the future has got to be a leader. It will take real understanding of business processes and information technology to be a real effective CIO.

We're going to have more packaged solutions than today. We've gone partway with the SAPs and Baans and others, but we will go much further. In most industries, there will be one or more standard solutions for most problems. The amount of custom development will continue to diminish.

CW: What about the IS organization? What will it look like?

HESCHEL: It will change dramatically. IS will continue to manage a large central database because you have to have consistency across the company. I see that continuing indefinitely. Where I see the real change coming is with the kids coming out of school now. They're able to use a PC and do things with that information to make decisions. So I see fewer centralized programming-type people required to generate reports for them.

I see more business savvy in the analysts in order to understand the requirements. I see leaner organizations, but more money spent on information-based capabilities — intranets and extranets of all types, companies sharing information.

FELD: I'll echo the central database. The No. 1 charter of an IS organization of the future is managing data in an enterprise fashion.

HOPPER: We're continuing to see technology solving technologists' problems, but in many ways, we've been the cobbler's children, putting technology out there without knowing how to manage it. We're moving to a world where IS folks will be facilitators and businesspeople who understand the tools to choose from to solve problems.

CW: How will we interact with our computers?

HESCHEL: I see a tremendous growth in voice-activated commands. We'll see a heck of a lot easier ways to use PCs. More graphics, more touching images to get things accomplished. We're experimenting with using fingerprint-recognition technology to interact with financial services institutions. That seems to be working very well.

Computing in households or by individuals will become more like a utility or the telephone. You pay for what you use, and it will be fairly easy to use it.

HOPPER: Computing will be far more proactive than reactive. We will have smart devices that will be attuned to doing things for us. Voice is going to be important, but we are going to have a host of interactive, full-bandwidth visualizations — for example, the ability to preview a trip before you take it.

FELD: People work in different ways. I will be able to get the technology to profile how I want to run my business or look at things and then do it my way instead of the machine's way.

CW: What lessons have you learned from building some of the legendary systems in technology that will apply to the next decade of IS? What advice do you have for people trying to use technology for competitive advantage?

FELD: Companies need to keep investing and renewing the systems that may have been legendary 10 to 15 years ago and not just ride them. We're still looking at a lot of Max's code in the airline business 20 years later, while both the business and technology have changed dramatically during that same period.

HOPPER: I agree with Charlie that continuous investment is key. One aspect is how it gets reinvested. Too often it gets reinvested with minor upgrades. In some cases, you have to do a big replacement investment.

You asked about seizing strategic advantage. I don't think that's a worthy objective. I'm not convinced you can use technology to create sustainable competitive advantage. That comes from being better in the business you are in, which means marrying technology and business in a joint solution.

HESCHEL: At American Hospital Supply, we didn't say "Objective: Sustainable competitive advantage." It was a customer-service orientation; we were providing customers something they would like and want. You approach that today by picking your most important business processes, looking at them and seeing how technology can help. Wal-Mart took the most important pieces of its supply-chain process and used technology to make them much more efficient and drive down costs. This also can be accomplished with customers.

More online

For audio and an extended version of this story, see our Web site at *www.computerworld.com/nextdecade*.

CW: OK, it's the next decade. Looking at the past 10 years, who were the big winners and losers?

HESCHEL: Certainly Microsoft and Intel. I think IBM will be a major player. I worry about some of the older guys — Unisys, NCR and so forth. I wonder what role they'll play, although I am sure there will be one. If you're not an information-based firm, you'll be gobbled up. □

"WE'RE CONTINUING TO SEE TECHNOLOGY SOLVING TECHNOLOGISTS' PROBLEMS. . . . WE'VE BEEN THE COBBLER'S CHILDREN, PUTTING TECHNOLOGY OUT THERE WITHOUT KNOWING HOW TO MANAGE IT." — MAX D. HOPPER

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Appliance Reliance

IN A SENSE, THE FUTURE OF COMPUTING IS NOT COMPUTERS,

according to Joel Birnbaum, senior vice president of research and development at Hewlett-Packard Co. and director of HP Laboratories.

In the next 10 years, computer technology will proliferate in the form of easy-to-use devices with specific uses and simple interfaces that hide the underlying advanced technology, he says. Birnbaum has imagined a world of such "information appliances" since the 1970s.

Some information appliances will work on their own, but most will derive their capabilities from information utilities: distributed and powerful network-based services with the reliability of today's power and telecommunications utilities. General-purpose desktops and laptops will continue to evolve, but broadening the horizon of technology in the coming decade will be specialized appliances in which computing is done in the background.

In an interview with Computerworld *staff writer David Orenstein, Birnbaum explains how information appliances will become a pervasive mode of computing:*

For a long time, I've kind of believed that the great mass of computing is going to be done by specialized devices that are intuitive to use. You can learn a device in terms of the function it performs, just as you can learn to use a vacuum cleaner or a VCR or CD player. Most of the computers in the world will be embedded computers.

There are two key questions here. One is, Can you make them intuitive to use? That is, can you make a computer as easy to interact with as the common use of consumer appliances? If you answer that question positively then the second one is, Would anybody care?

My view of the computer of the future is that it is more personal, more idiosyncratic, less obviously a computer device than it is something that does a job that people want to do. It will have things that are inside it that people use intuitively and that they don't worry about how they work.

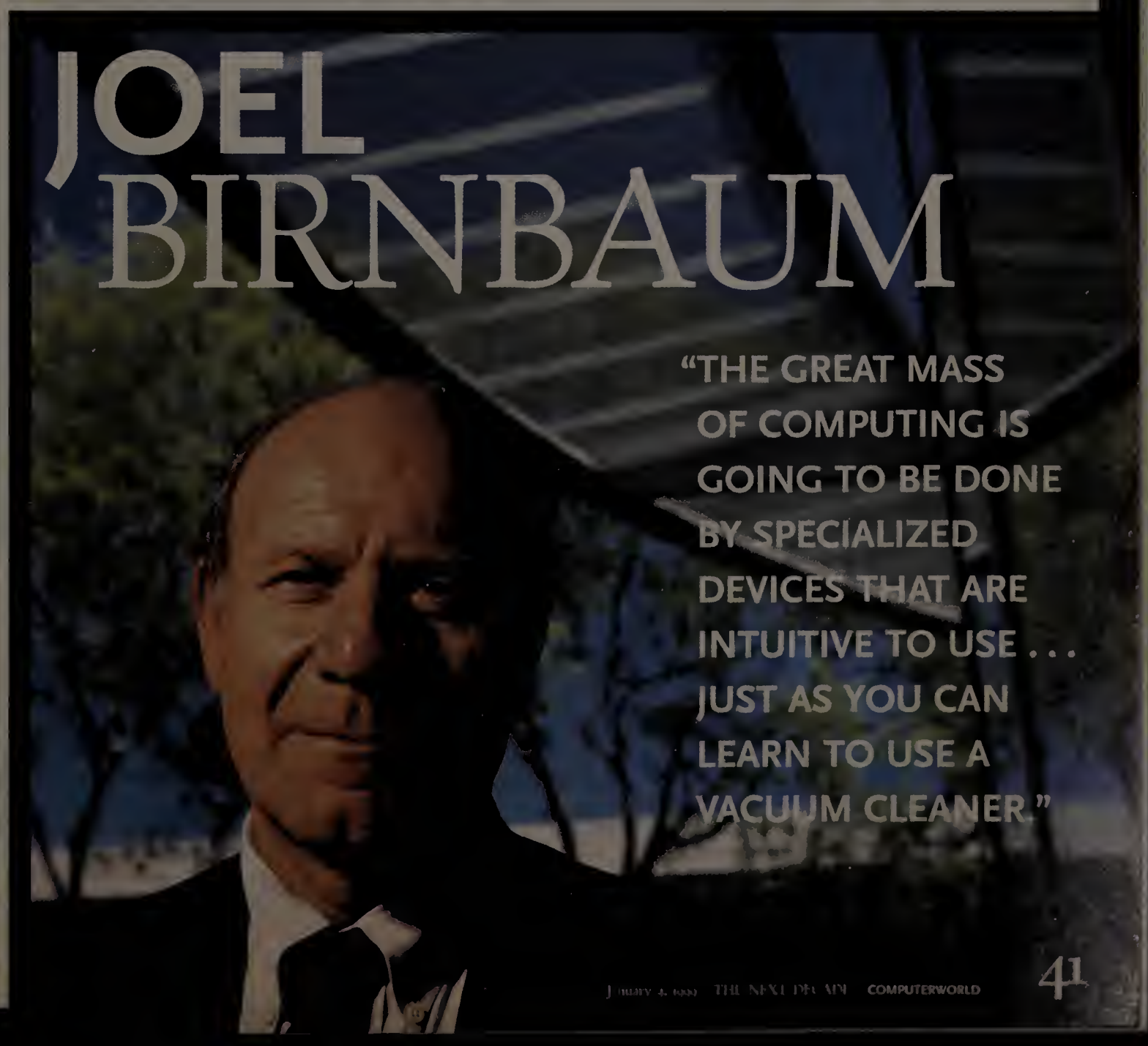
In the next 10 years . . . bandwidth costs will be so low. There will be a set of opportunities to put in very rich user interfaces that will make computing available to those people who are not computer people without [those people] having to bear the cost of the device itself. In other words, if the bandwidth is great enough, the computation can be done by the network rather than a device, or at least some part of it can be done.

Computers will get very specialized. A class of servers will emerge on the network, which will be as specialized in their way as these appliances are.

So what does the utility look like? I have been thinking about that probably since about 1975 or 1976. The utility itself hides the operating system. You might have five different service providers, and they might have written their things at different times in different ways. You, the user, want to see a consistent user interface. That lets you run it on different kinds of machines, run it from different places, and in particular it lets you add resources when you need them and pay for them only as you use them. It builds on top of all the information and communications capabilities of the Web, but it adds services and computation where appropriate.

Frankly, about five or six years ago, I stopped talking about the information utility. I stopped really believing in it. I was, really, I would say, in quite a bit of despair. And then the miracles occurred. One was the Web. And then the second miracle was . . . the geniuses did Mosaic. The notion of a browser, which was point-and-click, suddenly made it accessible to everybody.

I think [information appliances and utilities] create huge opportunities, which is not to say that the current players are going to go away. I think a lot of the value-added and profit is going to come from the services that are added to the network and not the core hardware platforms. I don't think any of us — the traditional hardware systems manufacturers — are going to be very successful unless we change our business models dramatically. The rise and fall of companies will be very great. □



WILLIAM MERCER MCLEOD

"INFORMATION SECURITY WILL BE LIKE THE OLD WEST. LAW ENFORCEMENT WILL ASSUME THE WYATT EARP ROLE TO COMBAT THESE JESSE JAMES-STYLE CYBERCROOKS."

MARK GEMBICKI

ON HIS 17TH BIRTHDAY, MARK GEMBICKI STARTED work at the National Security Agency's (NSA) Research and Development unit – plucked out of high school after testing off the charts in electronics and computer science.

In 1987, Gembicki helped form InfoTek Systems Inc., which produced technology now used in cable boxes. His current venture, Warroom Research Inc. in Annapolis, Md., is a consulting firm that performs penetration tests on firewalls. "When CEOs and CIOs appear on TV telling reporters their networks have never been hit," says Gembicki, now 33, "we're getting the truth from their security administrators."

This is Gembicki's story, as told to Giga Information Group analyst Laura DiDio, a former senior editor at Computerworld.

I joined the NSA when I was 17, in 1982. That coincided with the release of the movie *War Games*, which gave the public its first look at a teenage hacker who made the old guard sit up and take notice that, hey, they may have pimples on their faces, but we'd better listen to their ideas.

I didn't know until after I got to the NSA that it dwarfs the CIA and all other U.S. intelligence agencies. There was a book out then called *The Puzzle Palace*. People would say to each other, "Has your name popped up [in the book] yet?" "No, but I'm in the index." So I knew I was working for some pretty powerful guys.

The NSA hired me primarily because I had a propensity for hardware and electronics, so I got to work on a bunch of very interesting programs. I found out a few years ago that one of the programs I worked on back in the early 1980s grew into something called the STU [Secure Transmission Unit], which evolved into the overall secure communications infrastructure that's now used throughout the world.

Ten years from now, there will be two Internets. One will be designed strictly for research and consumers. It will have the same level of security we see today, which is fair-to-middling.

The second Internet will be deployed by banks and other core infrastructures [such as] the telecommunications industry. This will be used for true electronic commerce and sensitive transactions such as technology transfers.

The future of information security will be like a return to the Old West. Law enforcement will have to assume the Wyatt Earp role to combat these anarchic, Jesse James-style cybercrooks. We're going to have to empower our law enforcement agencies with a lot more latitude to quickly investigate and prosecute elusive cybercrooks, who often get away because of the borderless Internet.

Americans are too dependent on information technology. We're not stopping to consider the ramifications of being so digitally dependent, which is the point that Cliff Stoll made in his book *Silicon Snake Oil*.

Going forward, we won't have scattered, random computer crime. We'll see much more orchestrated attacks. It won't be 15- or 18-year-old perpetrators. The hacks of the future will be driven by cybercartels — which are forming even now.

We're starting to see a portent of things to come. In September, for example, the Department of Defense acknowledged that computer networks at multiple government facilities were attacked simultaneously. The only way that could have happened was if a unified group was acting in concert.

The fallout of the U.S.'s overreliance on information systems will be a loss of our competitive edge. We focus too much on making the information look pretty instead of determining what value the data actually holds and how to secure it.

I think, believe it or not, the Europeans will take the lead in IT, and the Japanese will be the dominant force in computer hardware. American firms will retain their edge in software. U.S. firms, by their own admission, get hacked over 20 times more than foreign firms. That's because of our own societal arrogance; we don't believe our systems can be penetrated.

In the next 10 years, the entertainment, telecommunications and computer companies will compete for ownership of the information pipeline into our homes and briefcases. Companies that survive will dominate. Firms that create highly usable products will dominate. I think Cisco Systems will have a hand in all information security companies. They have the hardware resources and a distribution channel unlike any other company.

ACHILLES' HEEL

Computer security will continue to be our Achilles' heel. The U.S.'s critical infrastructures, which include government, communications, airlines, water, oil, utilities and the defense grid, are all terribly at risk.

The petroleum industry will be the biggest target, for two reasons. First, we've got discontented environmental factions. Second, the security councils of the petroleum industry are not doing what they should to interface and cooperate with law enforcement and government to minimize vulnerabilities.

Most people look for obvious doomsday scenarios. However, a computer-based attack launched against the petroleum industry wouldn't necessarily result in oil spills. But you could have an even more insidious catastrophe, such as hackers altering logistical data on a massive scale to affect the barrel price of oil. This could put countries into an immediate recession. Or it could trigger a panic reminiscent of the gas shortages of the 1970s.

The scary truth is that the cybercrooks and the emerging cybercartels are much more organized and motivated than American industry and law enforcement.

Without close cooperation between the latter two, we're doomed. By the year 2000, I think we'll see a major infrastructure attack that leads the nightly news. The odds are good that either the petroleum or the medical/health care [industries] will be the first to suffer a pervasive hack. Going forward, we can expect the medical community networks to suffer significant invasions of privacy.

The bottom line is, we should not worry about building bigger, faster and better information systems. We should address the real challenge: building more effective systems that are designed to be secure. □

KATHERINE LAMBERT

FutureTense

WHAT DOES IT TAKE TO MAKE SOFTWARE DEVELOPMENT MORE PRODUCTIVE?

Computerworld finds that users prefer StarTeam® collaborative development from StarBase.

In their April 6, 1998 issue, Computerworld asked StarTeam users and version control software users to discuss product capabilities and potential. The results speak for themselves:

- "I got more done in one day with StarTeam than I did in two weeks with the other products we evaluated."
- "Part of StarTeam's beauty is that all of its functions are integrated under one interface."
- "As more nondevelopers take integral roles in the development life cycle, ease of use becomes critical...The makers of StarTeam know this, and it shows in the interface, users say."

StarTeam encourages collaboration with features such as **Location Transparency,** so team members can access any type of file, from wherever they are. Use our Windows client, our Java client or your browser across LANs, WANs, the Web or the Internet. **Visual Configurations** eliminate the error-prone, time-consuming process of using labels. **Generalized Linking** lets you link all the items in your repository in any number of ways to preserve context. Our **File Management Interface** preserves the structure of your projects. And our integrated **Defect Management** and **Threaded Conversations** capabilities dramatically increase your team's productivity.

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COMPUTERWORLD 79

April 6, 1998

REVIEW CENTER

You gotta have teamwork

Eight users of two different types of team development/configuration management tools report: The products have some challenges but are essential to a smooth development process

StarBase's StarTeam encourages collaboration

By Kevin Burden

Growing interest in team development adds a new dump of challenges to application development. The risk of team members stepping on one another's toes increases with the number of developers sharing files.

Enter software configuration management tools.

Configuration management, which also is called change management, is a catch-all name for tools that address the challenges of team development. Those challenges include knowing which files are being worked on and by whom; needing to roll back to previous file versions; tracking bug histories; and communicating with other team members.

Many development environments come with embedded tools to handle some of those tasks. But the problems with embedded tools become apparent when teams using multiple development environments work on the same project, says Al Smith, a senior systems analyst at T. Rowe Price Investment Technologies, Inc. in Baltimore.

Intersolv's PVCS presents a tough learning curve

The tools don't always mesh, and there is no common view of the project's flow. More important, reliance on such tools may exclude key nonprogrammers — groups such as marketing, quality assurance and end users. That's where third-party programs such as Intersolv, Inc.'s PVCS and StarBase Corp.'s StarTeam are intended to add value. They take different approaches to configuration management but are singled out by analysts as examples of the products in the sector.

PVCS comprises several products that address different aspects of change management and are sold separately. StarTeam comes as a fully integrated suite under a single interface.

Both products are intended to adapt to your development process, which tells developers what files they can work on and when; neither is capable of setting one.

These tools "can pull you out of a bind and fix problems. But without a process, you'll be in binds most of the time," says Betti Ouellette, director of quality and enabling at The Prudential Insurance Company of America in Newark, N.J.

USER VIEWS

Computerworld asked four PVCS users and four StarBase users to discuss the products' capabilities and potential.

EASE OF USE

As more nondevelopers take integral roles in the development life cycle, ease of use becomes critical for tools. The makers of StarTeam know this, and it shows in its interface, users say. But Intersolv didn't give ease of use the same attention, according to its customers — even experienced developers say PVCS is tough to use. Some of that can be explained by the two vendors' different philosophies toward project management. Intersolv's PVCS relies more on centralized control to deal with problems; StarBase emphasizes team collaboration.

"I got more done in one day with StarTeam than I did in two weeks with other products we evaluated," says Todd Mancini, principal software architect at One Source Information Services, Inc. in Cambridge, Mass.

Mancini says StarTeam seamlessly integrates with his different development environments (Microsoft's Visual C++ and Visual Basic), but he prefers to use StarTeam's interface over those of his development tools.

"All I do in C++ now is code. Everything else — check in, check out, project management — I do in StarTeam's interface," he says.

Part of StarTeam's beauty is that all of its functions are integrated under one interface, compared with PVCS whose products are separate.

That integration leads to functional advantages. For example, bugs found through the defect tracking program can be attached to the exact problem file, helping quality assurance teams know what bugs to test for. "I've not seen another product that can do that," says Mike Sly, technical manager at The Reynolds and Reynolds Co. in Dayton, Ohio.

PVCS users clearly don't share the same enthusiasm for its ease of use. "It has a horrible Windows interface," says Harsh Kalra, a senior programming analyst at T. Rowe Price. Kalra says PVCS works "fabulously" through the command line, but it could take weeks for contractors and new programmers to come up to speed.

"We looked at PVCS but pottered it leaned too much toward the techie type," says StarTeam user Capt. Keith Kocan, program manager at the Standard Systems Group in the U.S. Air Force in Montgomery, Ala. "The people that put together our user manuals need configuration management to coordinate all the documents, but they wouldn't be able to understand PVCS."

COLLABORATION

StarTeam users communicate through threaded conversations. One team member starts a discussion by sending an E-mail message through StarTeam's interface. StarTeam then automatically draws a relationship between the thread and project and tracks the initial message and its responses in a topic tree.

Besides facilitating conversation, StarTeam documents those conversations in a central repository. "If someone has the same problem months later, they can look up the conversation and not have to go through the same steps again," Sly says.

PVCS doesn't provide a means to document conversations. But it does offer a product called Tracker, which organizes and manages project issues such as feature requests, defect reports and other changes in a database format.

Developers can see the issues surrounding a project, but PVCS doesn't provide a way for them to communicate.

None of the four PVCS users interviewed are using Tracker. □

Burden is a Computerworld features writer.

The challenges of team development

Configuration management software aims to meet the challenges faced by team leaders and members alike

Team leaders' concerns:
- How can we capture all the project-related information?
- How do we manage widely dispersed teams?
- How do we track the progress of our development efforts?
- How can we tell when a problem has been resolved?
- How do we know when the project is ready for testing, quality assurance and production?

Team members' concerns:
- What changes are assigned to me?
- What are the priorities for making all these changes?
- How do I inform others I have finished a change?

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Net Essentials

LARRY ELLISON ARRIVES FRESH FROM A SPEECH to the clubby Agenda '99 conference in Scottsdale, Ariz. The speech is by now a familiar one: In the future, PCs will be replaced by Internet appliances, and software will be written for the Internet rather than the desktop. That message is increasingly hitting home with high-tech executives who fear Microsoft and want to savor the riches of Internet commerce. In an interview with *Computerworld* editor in chief Paul Gillin, Ellison expands on his ideas.

CW: What will be the biggest impact of information technology we'll see in our day-to-day lives in the next 10 years?
ELLISON: The Internet will go mobile. You will be connected in a car, at the beach, in a tunnel, in an airplane. You will always be connected to the Net. It'll be interesting, because if people want to get to you, they'll be able to, if you let them. It's going to make us more efficient. And distracted.

CW: What will computers look like?
ELLISON: The model will be an appliance. It won't be this ridiculous distributed concept we have now. On *Star Trek*, you don't see Spock or Scotty carrying around computers.

Data will be stored in centralized servers because that's the safest and most economical way to store it. You'll carry around a portable device, but you'll periodically plug it in to recharge the batteries and get the latest applications and save your data. It'll be as simple as plugging one cord in for electrons to recharge your battery and another for bits to move your data on to a professionally managed server, where it's safe and secure.

Internet computing will be with us virtually unchanged as a model, with applications and data on servers accessed through a network. It takes the computer network to the point where it resembles all other essential networks in the world. Look at the telephone network: It uses a very simple appliance with professionally managed complexity. The network itself is very complex, but the end user sees none of that. The same thing is true of the television network. It's enormously complex, but everyone has a relatively simple device to use it. The computing model with the Internet suddenly looks exactly like that.

CW: Does that mean we'll have fewer servers?
ELLISON: I don't think Burger King wants a little database in every hamburger stand. I think they want a unified database so they can drill down and look at what's going on inside one restaurant.

We'll have vastly more power but fewer discrete servers. The problem is that the labor associated with a little server and a big server is about the same. So if we can consolidate to a smaller number of servers, we're better off.

CW: What will be the dominant business and home apps?
ELLISON: I think you'll see a consolidation of fragmented [back-office] systems to global systems. This concept of national or office systems will disappear.

We'll also move out of the back office and more aggressively into the front office. We're going to record every interaction with our customers in a database. We'll know much more about our customers on a global basis.

Your home will have little networks, but your data will not be stored in the house. You'll have big storage farms, and you'll buy some network service that will store it for you — guarantee backup and security.

CW: Will the disparity between the haves and have-nots widen?
ELLISON: It improves over time for two reasons: One is that the cost of computing will go down. And you'll have free services available on the Internet for not much money.

The online service will be almost given away. Like a broadcast TV model, there'll be such a surplus of network capacity that the network companies will give away basic network services and pay for it with advertising.

CW: What does the operating system of 10 years from now look like?
ELLISON: Andy Grove recently said the operating system will become anonymous. Today, people write programs to run on Windows. In the future, those programs will run on the Internet. It doesn't make any difference what the operating system is.

CW: How about the computer industry power structure?
ELLISON: The dynamics of competition on the Internet will make it impossible for any one company to dominate. You really will have just what Bill Gates says he wants — you really will have innovation. □

STEVEN BORNS

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*2,599,200 transactions per hour, to be exact, and with 1000 & 2000 concurrent users. These measurements were done in a customer benchmark of Forté on OS/390 version 2.5 using UNIX System Services.

The Calm After the Storm

MOST PEOPLE KNOW JOHN SEELY BROWN AS THE chief scientist at Xerox Corp. and director of its Palo Alto Research Center (PARC), birthplace to technologies such as graphical user interfaces, and object-oriented languages. But he's also the founder of PARC's cognitive science research group — a specialty that becomes apparent when he talks about the future. In an interview with *Computerworld* senior editor Anne McCrory, Seely Brown forms his vision of the next 10 years of computing by the way the human mind works and what technology has to learn from it:

Think about your drive into work this morning: navigating the traffic, seeing the road signs, checking your speed and mirrors, listening to the news, humming a tune, drinking your coffee, remembering your co-worker's birthday today. All that, speeding along at 65 mph, and yet the moment that squirrel darted into the road, you slammed on the brakes.

It wasn't your computerized antilock braking system that saved you. It was your mind. It sifted through the 10,000 stimuli coming at you to recognize the one you *really* needed to know about at that moment. That's what the computers of the future will let you do.

That's what we here at Xerox PARC call ubiquitous, or calm, computing — computers with seamless interfaces. It's a completely different concept from what we have today, as we grapple with intrusive devices — pop-up E-mails, phones ringing — and too much information we don't need. We've increased our tunnel vision but decreased our ability to become attuned to things happening around us in a subconscious way. That's one reason everyone is so frazzled. So what excites me as we move forward is that technology is finally getting powerful enough to get out of the way.

These seamless interfaces will become critical as we adapt to the coming Information Age and a global economy that will be based not on making products, but on making sense of the world around us. Successful companies will outsource their manufacturing and instead spend their time identifying new niches and new needs and devising and marketing products to fill them. The only sustainable edge a business has is to learn faster than its competitor. And to do that, it needs to share knowledge within the firm, to interpret and make sense of the world faster than others.

Companies can't do that without the creativity and collaboration of their people. And systems must help. They should help us communicate as efficiently, as subtly, as effectively with our colleagues in distant offices as with our colleagues who sit one desk away. They should help us learn from each other and find ways to store that knowledge where others can easily find it. I don't mean knowledge management as it's known today; that's information management — indexing and retrieving documents. In the future, we'll have not 10,000 documents but zillions, and we'll need robust architectures that can handle that volume as well as link thousands of components dynamically together. We will also need systems that think and even repair themselves.

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That's right: organic systems. We will bring the worlds of material science and computing together by building smart matter — inorganic components with the almost biological properties of self-diagnosis and repair. These components may even be microscopic, and they will be able to perform physical feats very accurately on a very small scale. Take high-speed color printers. They require accurate registration of the image as it is generated four times. Using microscopic pieces of silicon that act as cilia, the printer could adjust the paper even just a micron so that all the colors would line up. Thus, we have a moving surface without any visible moving parts. This will enable us to build whole new classes of appliances.

Meanwhile, we will find ways to capture knowledge as it is created, establish a way to find it again later and then communicate it. A video of a meeting or diagrams drawn on a whiteboard could be automatically summarized and indexed, with a software agent going out to alert people who need or want to view it. Everything — copiers, fax machines, the office coffee pot — will be connected to the Internet.

I will feel like I'm connected to all kinds of people and be aware of what they're up to without having to focus on it, the way I know to ask a colleague a question when he swivels around in his chair or to swerve around trash in the road when I'm driving and deep in thought. I call these new environments "information fabrics," and they'll accelerate our ability to learn by filtering out all the noise we deal with today. Will this all happen in 10 years? Some of it will start to happen in three and certainly will be here in 10. Our only limits are thinking that's trapped by the computing conventions we are so used to. And our imagination. □

WILLIAM MERCER MCLEOD

KILLJOY CORNER

BY MITCH BETTS

A VETERAN OF TOO MANY TECHNOLOGY PREDICTIONS EXPLAINS WHY ALL OUR VISIONARIES WILL BE WRONG

WITH ALL DUE RESPECT to the luminaries in this special issue: Their 10-year predictions are very likely to be wrong, some laughably so. It's not that these people aren't smart. But when it comes to specific, long-range predictions about technology, the whole human race has a rotten track record — for reasons that are, um, quite predictable.

Those who witnessed — or took part in — the birth of the telephone, radio, laser, computer, steam engine, VCR or countless other inventions were terribly inaccurate at imagining their futures, says Nathan Rosenberg, an economist who studies technological change at Stanford University. Marconi thought his new radio would be used only for ship-to-shore communication. Invention of the transistor received a tiny mention inside *The New York Times*, which said it "might be used to develop better hearing aids for the deaf." Western Union turned down the chance to buy Alexander Graham Bell's telephone patent for a mere $100,000.

In hindsight, the future was "obviously not obvious," Rosenberg says. And there's no reason to think we can do any better — so don't be smug.

One problem is that new technology first appears in such a primitive state that it's hard to imagine it has any future at all. In 1949, IBM predicted there would be a market for no more than 10 to 15 computers. The fact that the early machines relied on 18,000 vacuum tubes and took up an entire room probably limited everyone's imagination, Rosenberg says.

Sometimes technology A doesn't take off until a complementary technology B arrives. The laser didn't revolutionize communications until it was hooked up to fiber-optic cable. The Internet wasn't such a big deal until after Tim Berners-Lee decided he needed a hyperlinked telephone directory and wrote the software for the World Wide Web.

Many of the predictions you see at this time of year are nothing more than extrapolations from today's conventional wisdom. That's dangerous. The prevailing view in the early 1980s was that an unshackled AT&T would become a big player in the computer industry. So in 1982, when *Omni* magazine published its predictions for 2000, it said, "IBM will find itself competing with AT&T on the high end of the spectrum and Atari on the low end." AT&T? Atari?

Beware of specialists who make predictions, says futurist Graham Molitor, because they fail to consider factors outside their fields of expertise. Frequently neglected by technologists are the social, legal and political climates to come. That's why it's so naive to think the Internet will remain an unregulated and untaxed frontier for long. Communications media get regulated and commerce gets taxed. Period.

Somehow, it never occurs to technologists that consumers won't just gobble up every gizmo they can conceive. In the 1960s, AT&T figured that at least 3 million Picturephones would be in use throughout the U.S. by the late 1980s. That obviously didn't happen — and not just because Americans didn't want to jump out of the shower to answer a Picturephone. It also was too expensive: Initially, the terminal cost $1,500, plus a service charge of $100 per month.

When we make 10-year predictions, we like to think there will be dramatic changes between now and then. But will there be? Widespread adoption of even the best ideas takes longer than we expect. The "Year of the LAN" was 10 years in the making. Business concepts such as total quality management and using information technology for customer service took seven years to become mainstream, according to the American Management Association.

So what's a reader to do? Enjoy. Be a careful consumer of predictions and gee-whiz articles. Don't take them too seriously. Remember that, according to Gartner Group, emerging technologies go through four stages: hype, disillusionment, enlightenment (when the technology is ready for prime-time use) and real-world productivity benefits.

At the moment, for example, biometric identification technologies are in the hype stage and headed for disillusionment real quick. How many Americans are going to warm up to the idea of getting fingerprinted or eye-scanned to do routine transactions? Smart cards have already fallen into the disillusionment canyon and may never climb out, except in a few niche markets.

But some humility is called for. As that great philosopher Winnie-the-Pooh says, "That's what I think, but I don't suppose I'm right." □

Betts is an assistant news editor at Computerworld. *His Internet address is mitch_betts@cw.com.*

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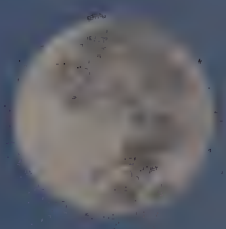

"If they can put a man on the moon, why can't they solve my company's IT problems?"

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Software

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Briefs

NetWare Java kit

Novell Inc. in Orem, Utah, has announced the availability of its new Developer Kit. The product allows users to create Java applications for the company's NetWare, Novell Directory Services, GroupWise and ManageWise products. The kit is free to members of Novell's DeveloperNet program.

Sun Java tools

Sun Microsystems Inc. has released Version 1.1 of its Java Media Framework application programming interface. The product lets developers add multimedia elements to their Java applets and applications.

Sun also has released a programming interface for three-dimensional objects. And it has shipped a 1.0.2 maintenance release of the Lightweight Directory Access Protocol for the Java Naming and Directory Interface, which is used in server-side enterprise applications.

IBM free Java code

IBM has announced that it is making available the source code for its Jikes compilers. Jikes is a stand-alone source-code-to-byte-code compiler.

Data transform tool

Carleton Corp. in Minnetonka, Minn., has released PureDimension, a high-performance data transformation tool that allows users to convert data for data warehousing into a form compatible with the leading online analytical processing (OLAP) databases and analysis tools.

These tools include Information Advantage Inc.'s DecisionSuite, MicroStrategy Inc.'s DSS Agent, Hyperion Solutions Corp.'s Essbase, Oracle Corp.'s Express and Discover, Hummingbird Communications Ltd.'s Pablo, Cognos Inc.'s PowerPlay, Brio Technology Inc.'s BrioQuery and Microsoft Corp.'s OLAP.

The product runs on Windows NT and all major Unix platforms. Pricing starts at $70,000.

Java 2 critiques in; views mixed

▸ *Graphics better, but browser support a worry*

By David Orenstein

JAVA'S USER INTERFACE and graphics capabilities are improving, but the size of such visuals and the inconsistent support among browsers for the new features are making developers wary of using them.

Corporate users looking to Java 2 for thin-client development find its visuals to be too slow, an analyst said.

The new features come in Sun Microsystems Inc.'s Java 2, announced last month. In its core — not as an add-on — it now has visual tools called Java Foundation Classes. These include the Swing user interface components and the Java 2D application programming interface (API). Sun also released the Java 3D API for three-dimensional images. [CW, Dec. 14.]

With Java 2, developers can write visually appealing programs entirely in Java, said Mike Gilpin, an analyst at Giga Information Group Inc. in Cambridge, Mass.

But, Gilpin said, many corporate programmers who look to Java for thin-client development still find Java's visuals too slow and too likely to complicate the deployment of Java applications on different platforms and browsers.

But for client/server and desktop development, many firms have little need to abandon Windows languages such as Visual Basic, Gilpin said.

The inconsistent support among various browsers and versions of browsers has prevented Eaton Corp., a Cleveland-based manufacturer, from using visual Java components in its applications, said Clayton Ferguson, project manager of emerging technologies. Instead, users see leaner, well-supported HTML applications, even though these applications may require page reloads, even for simple data queries.

David S. Moore, principal engineer at RWD Technologies Inc. in Columbia, Md., said he has written prototypes with Swing components and would like to work with them but is concerned about inconsistent support in browsers and the

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Mott's juices R/3 with performance monitor

▸ *Envive application uncovers hidden snags*

By Craig Stedman

AFTER MOTT'S NORTH AMERICA went live with SAP R/3, its users' work slowed down. But the applesauce and juice maker's attempts to find out why were stabs in the dark.

R/3's built-in systems management tools let Mott's information technology staffers look at only the internals of the application engine itself. Mott's couldn't see what was happening to R/3 transactions once they left the application server and got on its network or the PCs at the end of the pipe, said Mark Tarsi, director of application technology at the Stamford, Conn., company.

That became a problem in late 1997, when the number of users and the amount of data stored in R/3 grew large enough to start stressing the system. So last spring, Mott's became one of the first users of a new breed of non-SAP R/3 performance monitoring tools that cast a wider eye on SAP's market-leading enterprise resource planning applications.

Developed by Envive Corp. in Mountain View, Calif., the product — one of several available from small software vendors — is helping Mott's uncover hidden throughput snags.

"Before, users would call up and say their response time was horrible, and there was a lot of gut feel and guessing about what was happening," said Dom Verrastro, director of data center services at Mott's. "Now we can put facts and data behind that."

For example, electronic ordering by grocers, which accounts for 80% of the orders that Mott's receives, started taking longer with R/3. Verrastro said Mott's was able to isolate that part of the system and find out what was bogging things down so that the order-processing configuration could be streamlined.

Mott's also discovered that some of its 400 R/3 users were mistakenly set up to run resource-hogging transactions that go deep into the system and read all the records in a data table, Verrastro said. And it can now put a microscope on individual users and identify ways they can use R/3 in a more efficient manner.

Other vendors selling R/3 performance monitors include Luminate Software Corp. in Redwood City, Calif., and Naples, Fla.-based OptiSystems Inc. [CW, Sept. 7].

In late December, OptiSystems officials said an upgrade of the company's performance analysis tool for R/3 is due for shipment in January.

The new tools are a big advance over R/3's built-in monitoring software, which "is hard to get meaningful data out of," said Steven Tirone, an analyst at AMR Research Inc. in Boston. But he estimated that only a few dozen companies have started using them.

In addition, the products from Envive and its rivals primarily are reporting tools that leave the application management process a manual affair for R/3 users, Tirone said. "What they're doing is essentially the easy part," he said.

Mott's still is waiting for Envive to integrate its response-time monitoring software with a separate tool that analyzes R/3 service levels, Tarsi said. But just being able to track basic transaction performance is a boon because it's hard to test the applications before going live, he added.

"We simulated everything, but the system really didn't get its first full-blown run until we flipped the switch," Tarsi said.

MOTT'S NORTH AMERICA

HEADQUARTERS: Stamford, Conn.

PARENT COMPANY: Cadbury Schweppes PLC

WEB SITE: www.motts.com

MAIN PRODUCTS: Juices, applesauce and molasses

NUMBER OF R/3 USERS: 400

SYSTEM DETAILS:

- IBM RS/6000 SP server
- Oracle databases
- R/3 finance, manufacturing, logistics and human resources applications

Snapshot

Why users buy document management systems:

1	To improve customer service	72%
2	To lower costs	55%
3	To meet regulations/ standards	48%
4	To speed time to market	45%
5	To increase revenue	36%

Base: Survey of 500 users across Europe; multiple responses allowed
Source: Strategy Partners International, 1997; Ovum Ltd., London

Java 2

CONTINUED FROM PAGE 93

possibility that graphics would hurt performance.

BAX Global, a logistics company in Irvine, Calif., uses Java where it can, because its platform neutrality lets the company port its server-side code to other platforms as a server hits its limits.

Programmers can also continue to work in each of those different environments, said Michael Ingardia, a consultant who is employed by Atlanta-based Peridyne Technology Solutions LLC and is currently working at BAX.

On BAX's intranet, users see a Java interface and rich-looking maps, helped along by the Jviews tool from Java graphics component-maker Ilog SA in Gentilly, France. "In that case we have more freedom because we have more control over the user," Ingardia said.

But over the Internet, where users are more diverse, the company sticks with HTML as the front end. □

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NEW PRODUCTS

THE GREAT ELK CO. has announced Panorama, data warehousing software designed for nontechnical users.

According to the Bannockburn, Ill., company, the relational online analytical processing tool connects directly to any database supporting Microsoft Corp.'s Open Database Connectivity standard. It offers a drag-and-drop interface for creating and running inquiries, and it provides automatic optimization of queries, percentage calculation and management, color-coded variances in tables and filter tools.

The price is $1,000 per user for implementations of 100 users or more.

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www.greatelk.com

LEGATO SYSTEMS INC. has announced NetWorker Remote, backup software for remote desktops and laptops.

According to the Palo Alto, Calif., company, NetWorker operates on a Windows NT Server and provides centrally managed data protection and disaster recovery. It transmits only changed data after an initial full backup and includes intelligent compression capabilities. Integration with Microsoft Corp.'s Explorer enables file and directory restores without administrator intervention.

Pricing starts at $25,000 for one Legato NetWorker Remote Server and support for 50 laptops or desktops.

Legato Systems
(650) 812-6000
www.legato.com

PILOT SOFTWARE INC. has introduced the Retail Performance Monitor retail application.

According to the Cambridge, Mass., company, the online analytical processing software provides a centralized view of the retail chain and can identify groups of unprofitable products within stores. It can also help users visualize the effects of price increases over time, evaluate the sales impact of markdowns and monitor location and merchandise contribution.

Pricing begins at $50,000.

Pilot Software
(617) 374-9400
www.pilotsw.com

STERLING SOFTWARE INC. has announced SAMS:VTape, software that enables a mainframe to work with "virtual," non-hardware-based tape-storage volumes.

According to the Rancho Cordova, Calif., company, the software uses existing disk and tape storage hardware and allows tape volumes to be written to a disk buffer, instead of directly to tape. The "virtual" tape volumes residing on disk can be served at disk speed and can be stacked before output to tape.

Pricing begins at $24,000.

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If you have a mainframe, somewhere around 70% of your corporate data is on it. But if that data is not available to the users who need it, it's being wasted.

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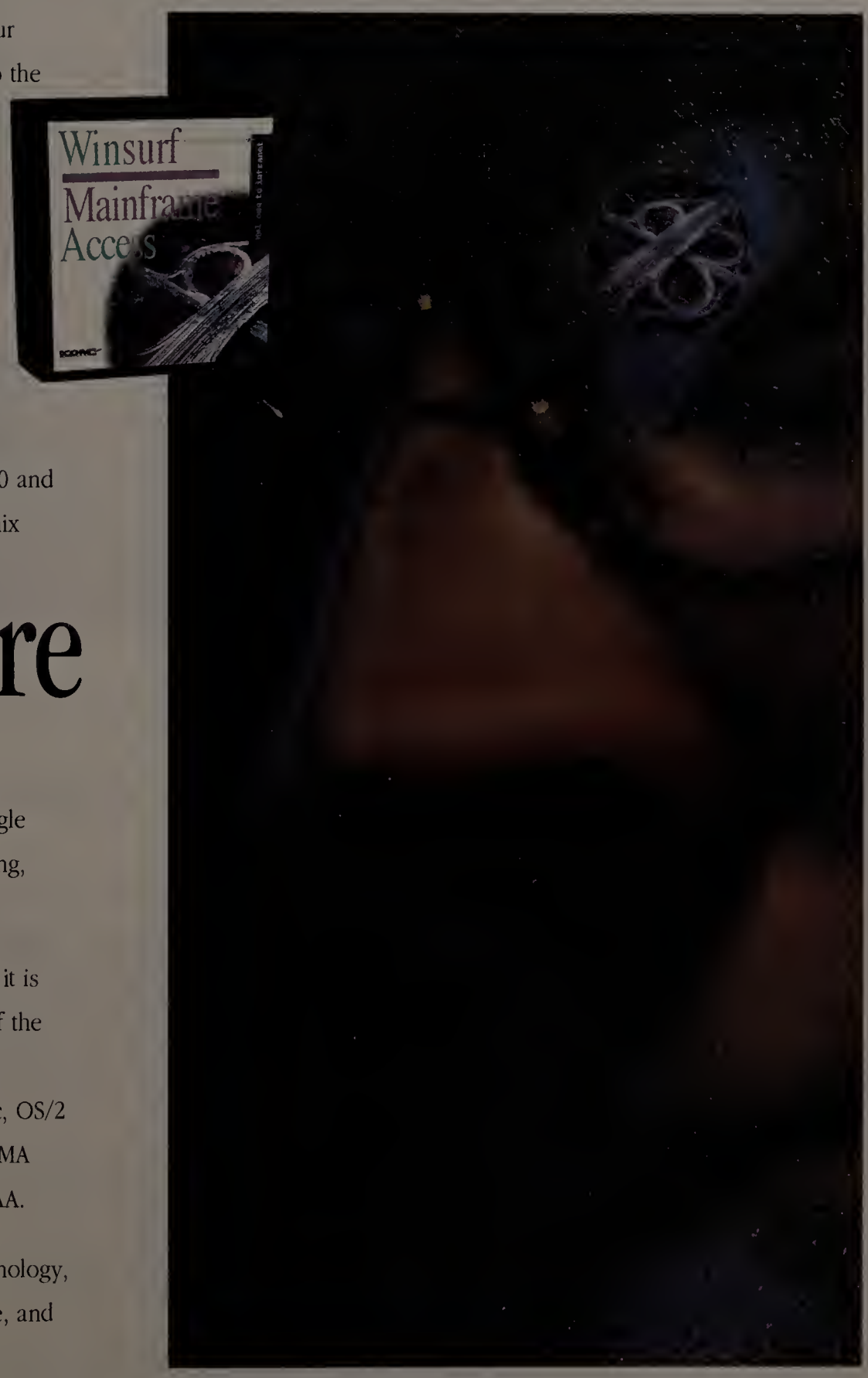

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hosts. WMA lets you control deployment, access and configuration rights throughout your network from a single central server. And you don't need to sacrifice full printing, HLLAPI support, or file transfer capability.

Web-to-Host technology is exploding; projections* show it is the future for host access. WMA's technology is ahead of the pack, with ease of use, native support for 16- and 32-bit Windows clients as well as HTML-based support for Mac, OS/2 and other clients. In addition to TN3270 and TN5250, WMA supports native access to SNA server and Netware for SAA.

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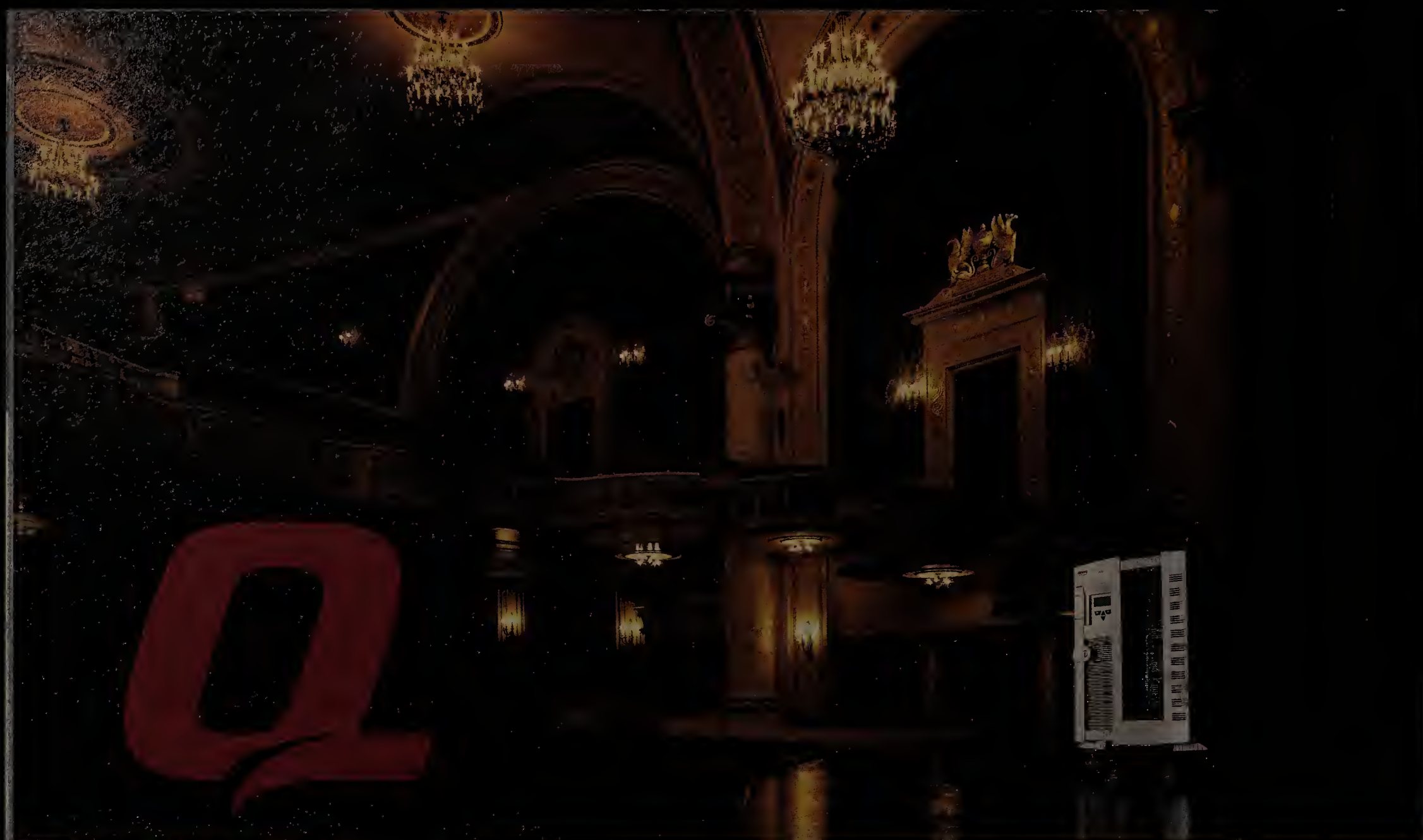
** Source: International Data Corporation*



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Briefs

Server quick-start

IBM has announced quick start-up packages for Oracle Parallel Server designed so that corporate users can implement the hardware and software in a matter of days. The cluster offerings unite the new IBM Netfinity 7000 M10 server with Pentium II Xeon processors, Fibre Channel storage and start-up support from IBM Global Services. IBM Netfinity Cluster Enabler Software for the Netfinity 7000 M10 Server/Oracle Parallel Server configuration will be available free from IBM's Web site this month.

Thin-client deal

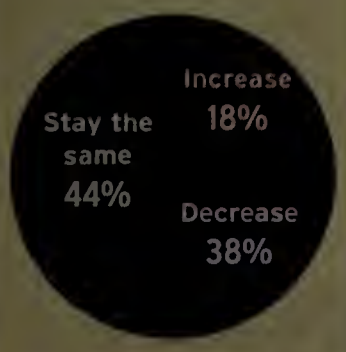
GraphOn Corp. in Campbell, Calif., has acquired Ottawa-based Corel Corp.'s JBridge thin-client technology and the JBridge engineering team and facilities in exchange for Corel getting a 25% share in GraphOn. JBridge provides access to 32-bit Windows applications from virtually any platform. GraphOn also offers remote access software for Unix and Linux on thin clients. Its licensees include IBM and Sun Microsystems Inc. in Mountain View, Calif.

Euro symbols

Washington-based CenturionSoft has developed a utility called EuroFonter that adds the euro symbol to all TrueType fonts. EuroFonter runs from and updates the fonts on Windows 95, 98 and NT 4.0. It costs $40.

STAYING ON COURSE

How will your PC budget change in the next two years?



Base: Survey of 50 Fortune 1,000 companies

Source: Forrester Research Inc., Cambridge, Mass.

PC market a hard drive in '99

▸ *Analysts predict year 2000 will push upgrades*

By April Jacobs

FOR PC MAKERS, 1998 was a year of falling prices and bullish sales, coupled with rocketing processor performance and manufacturing and distribution changes. The new year will be more of the same, analysts said.

1998 also was a year when corporate buyers tried to make sense of what seemed like endless processor upgrade cycles and falling prices. They also tried to control desktop support costs.

In 1999, IT managers will continue to grapple with total cost of ownership, analysts say.

Intel's chip pace "had a heavy impact on trying to have a standard PC — unless we bought them all within a month or two — which affected us in terms of service and support," said Dave Geiver, senior technology officer at First Premier Bank Corp. in North Sioux City, S.D.

The result has been a more complex desktop environment, so First Premier will focus this year on finding and implementing tools that let it automate software distribution. Desktop support tools that don't require technicians to visit end users also will be paramount, Geiver said.

1999 is expected to be marked by users frantically checking year 2000 compliance. That's likely to bring operating system upgrades from Windows 3.x and hardware upgrades to fix year 2000 flaws, analysts said.

Richard Fichera, an analyst at Cambridge, Mass.-based Giga Information Group, said companies with PCs that predate 1995 are open to problems, and he added that companies with Windows 3.x will be looking to upgrade. At least 30% of companies still run Windows 3.x, he said.

1999 also should be a year in which vendors such as Houston-based Compaq Computer Corp. and IBM try to redefine how they sell computers.

"In 1998, we proved that channel assembly is not the savior for the indirect manufacturers," said Steve Kleynhans, an analyst at Stamford, Conn.-based Meta Group Inc.

Companies such as Compaq and IBM tried that approach to match the facilities of build-to-order direct sellers such as Dell Computer Corp. and Gateway. Channel assembly uses systems integrators and distributors to custom-configure systems so that the PC maker can continue to make standardized systems in its factories.

"In 1999, there will be an increased focus on more direct contact with customers. All the indirect vendors have to find a way to build a hybrid model that bridges the gap between themselves and their customers," Kleynhans said.

Through it all, information technology managers will continue to grapple with total cost of ownership, analysts said. □

In 1998, PC manufacturers worked to reduce inventory:

- The combined value of inventory for PC makers, distributors, retailers and component suppliers decreased 18% in the third quarter of 1998 – a five-year low.
- The ratio of inventory to sales decreased from 0.21 in the second quarter of 1998 to 0.16 in the third quarter of 1998.

Source: Deloitte & Touche, San Jose, Calif.

Y2K PC buying spree means healthy 1999

By April Jacobs and Juan Carlos Perez

YEAR 2000 UPGRADES, coupled with the trend of faster-yet-cheaper systems, will boost demand for PCs in 1999, but only at the low end, said Steve Kleynhans, an analyst at Stamford, Conn.-based Meta Group Inc.

Kleynhans said there's been as much as a 30% drop in the price corporate customers are willing to pay for new PCs. Bid prices for corporate desktops averaged about $2,100 in January 1998 but had fallen to about $1,500 by December, he said.

The latest evidence of downward price pressures came from Hewlett-Packard Co., which last month cut the price of about 65 PC models, some by up to 20%.

HP's aggressive price cuts were unexpected because demand for PCs has jumped due to a year 2000-spawned upgrade demand, said Carl Howe, an analyst at Forrester Research Inc. in Cambridge, Mass.

But once that buying spree ends, the PC market is expected to slow late in 1999 and in 2000. Then, price wars will ensue, and industry revenues will drop by about 15%, from $55 billion in 1999 to $47 billion in 2000, Howe predicted.

"This drop in demand will come as a shock to many people," Howe said. Another factor affecting the PC market will be a rise in demand for network computers, he said, something that falling PC prices alone won't be able to offset. (Also see chart at left.) □

Perez writes for the IDG News Service.

A business card that's a CD

The business card of the future may be here today.

Ember Media Corp. in New York has developed a multimedia, business-card-size CD that can hold 16M bytes of information — be it a company's product catalog, a new product presentation or brochures.

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MICRODEVICES

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— Bob Wallace

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Managing

Flashback '98

LOOKING BACK

Q. What's happened to the people we've profiled — GE's Gary Reiner, GM's Ralph Szygenda, the married CIOs and Netscape's "Director of Reinventing?"

A. Plenty

LIZ AND NORM ALEXANDER: POWER COUPLE SHIFTS GEARS

Remember the married CIOs? They're now a CCC: a consultant/CIO couple.

Norm Alexander, still a CIO, is up to his neck in globalization. The Greenbrier Cos. in Lake Oswego, Ore., the railroad car-making company at which he works, has added plants in Canada, Mexico and Poland. The soft-spoken CIO traveled to Poland in May to see how things stood technology-wise; he found plenty of DOS-based Clipper database applications running on 386s. His next step: suggesting Greenbrier's next step.

Norm and Liz Alexander

Meanwhile, Liz Alexander parted ways with veggie-patty maker Gardenburger Inc. in early April last year.

Gardenburger's ad spot on the *Seinfeld* finale last May played a *little* role in her departure. Liz felt the company was holding back on information technology investments so it could put more money into advertising and marketing.

She didn't want to play Ms. Tight Fist, not when there was big money and greater flexibility in consulting.

So Liz hung out her own shingle as a consultant, and now she's managing a project for a natural gas company and giving Norm free advice at the dinner table.

Because after all, Liz jokes, "He can't afford my rates."

"The two years of overlap was dynamic and exciting," Liz says, "but that couldn't go on forever. We had two very demanding jobs. It was hard to give our all to the job and the family.

"Balance is never a static point, it's a continuous movement."

— *Allan E. Alter*

GM'S RALPH SZYGENDA: THE $700 MILLION MAN?

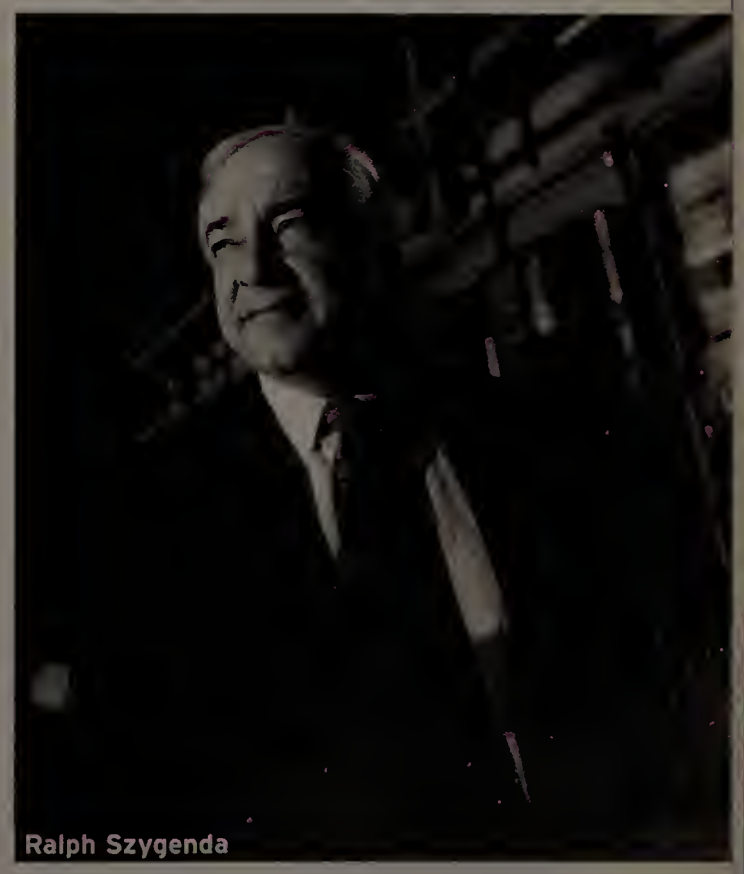
When *Computerworld* spoke with General Motors Corp. CIO Ralph Szygenda last spring, his top goal was to "do the impossible" or "what people think is impossible." Namely, to leverage IT in an effort to make dramatic changes at the $177 billion automaker.

Though Szygenda acknowledges that the world's biggest company still has "immense" challenges, he's well on his way to helping GM fundamentally change the way it does business.

Szygenda-led projects at GM include the following:

- A Web-based system called GM Buypower that lets consumers in the Pacific Northwest do online comparison-shopping between GM and non-GM vehicles through a third party. The system, which GM was to take nationwide at the end of last year, lets customers pick out a car or truck and gain preapproved GMAC financing online before picking up their vehicles at dealerships.
- The consolidation of 28 computer-aided design systems into one standard system for all GM-built vehicles within the next year. The standardization effort — aided by business process reengineering activities in GM's factories — has cut the product development cycle from three years to two, with hopes of whittling that down to 18 months.
- Deployment of an integrated supply-chain system called

Looking back, page 100



Ralph Szygenda

LOOKING BACK

CONTINUED FROM PAGE 99

Global 21 that will tie together vehicle production, sales and development. The system is being launched at a Saturn plant in Wilmington, Del.

Those moves, along with the 1996 restructuring of GM's outsourced IT services to Electronic Data Systems Corp., have helped shave $400 million in IT expenses during the past two and a half years, Szygenda says. Slashing GM's IT costs has been one of Szygenda's top goals for the past few years.

Szygenda said he expects the company to cut another $300 million in costs during the next three years, in part by replacing 70% of its costly legacy financial systems with SAP America Inc.'s R/3 systems during the next five years. That would add up to $700 million in savings.

"The industry said we couldn't do it," he says, "but clearly we're making significant changes."

— *Thomas Hoffman*

CIGNA'S 'BUD' BAUMANN: FROM IMPLEMENTER TO 'COACH'

Since we wrote about Charles "Bud" Baumann in April, he's let go of some of his day-to-day IT operations responsibility and moved further into growing Cigna Corp.'s disability insurance operations.

Bud Baumann

"When you're on the business side, you have to let go of some of the reins," Baumann says. That means "trying to be more of a coach, counselor, negotiator, supporter" as opposed to directing how to implement an IT solution.

As vice president of IT at Cigna IntegratedCare, Baumann is still in charge of integrating applications from Cigna's health care, disability and workers' compensation units.

But he spends half his time as vice president of Cigna's Managed Disability unit, "developing a business plan for the technology, putting together the right business processes to make that technology work [and] matching customer needs with our capabilities."

Meanwhile, the integration technology Baumann helped develop — now known as Cigna UniLynx — has been rolled out nationwide and is being fine-tuned. The ability to streamline the claims process by pulling together data from multiple applications is reducing disability costs by at least 15%, he says. — *Robert L. Scheier*

THOSE STRANGE JOB TITLES: MISSION RESTATEMENT

Early last year, Paul Davis was Netscape Communications Corp.'s empiricist, a title he chose for himself. As a quality assurance and testing specialist, he "believed in actual evidence and didn't take anything on faith" — an empirical approach.

Davis recently became OEM Project Manager, a title cooked up by the human resources team at Netscape to describe his new role of coordinating work among the company's development partners. But Davis is looking for something more Silicon Valley-esque to put on his business card.

"I haven't come up with any flashes of brilliance yet, but that title is way too boring for me," he says.

Ken Rice is still director of reinventing at Sentara Health System in Norfolk, Va., and he's still "reinventing, getting in trouble, causing chaos and getting slandered."

But not slandered as much, it seems. Rice's reinventing department changed its modus operandi during the year.

Its mission is still to help the company improve quality and cut costs, but it no longer acts as a think tank that dreams up new methods for others and hands them down.

Instead, it acts as an internal consultancy that responds to requests for help from other groups, including IT.

He called the realization that you can't improve quality without user acceptance an "a-ha" moment for some people.

— *Gary H. Anthes*

Ex-empiricist Paul Davis is looking to jazz up his new job title at Netscape, while Ken Rice is still "reinventing" at Sentara Health

GE'S GARY REINER: NEW DEAL AT SIX SIGMA

Three years into General Electric Co.'s Six Sigma quality gamble, CEO Jack Welch has brought in a new player.

Peit van Abeelen has moved from GE Plastics to the new post of vice president of Six Sigma Quality, replacing erstwhile quality czar Gary Reiner, who remains CIO.

Van Abeelen says the change reflects a natural progression from setting up the Six Sigma IT program, an IT-intensive effort, to following through.

"The first two years was a lot of infrastructure," he said in an internal GE communication. "Now you've got to make Six Sigma the way you work."

GE is playing awfully close to the vest, however. Neither Reiner nor van Abeelen was available for comment, and some Wall Street analysts think there may be more to the reshuffle.

"Six Sigma was rather bureaucratic, and there were some grumblings that all wasn't well," one analyst says. "Maybe [Welch] wants a change in the style or the pace of it."

Gary Reiner

Style aside, Six Sigma appears to be paying off for the utility. According to officials at GE, this year's estimated costs of $450 million for Six Sigma training and projects will yield cost savings of about $1.2 billion.

— *Kathleen Melymuka*

LOC KHUU: LOYALTY 1, RETENTION 0

When we last spoke with Loc Khuu, he was a new hire at The Chase Manhattan Bank Corp.'s Information Technology Associate Program.

Khuu had taken the job after four years in Chase's Smart Start program, a "farm team" designed to give students business experience and build loyalty while grooming them for full-time jobs upon graduation.

Loc Khuu

Unfortunately for Chase, Khuu recently signed on to a different team. He left the bank this fall to become a systems analyst at insurance brokerage J & H Marsh & McLennan Cos. in New York. "I thought it was a good idea to go to different places and learn different things while I'm still young," he says.

Though Khuu says the Smart Start program was a win for him and Chase, he says nothing can guarantee retention in today's free-agent IT market. "If you stay in one place too long, you become not as marketable as you should be," he says. "This industry is very dynamic. It's very tough for any company to retain skillful people."

Retention is elusive, but loyalty may not be. "I like to see different things," Khuu says, "but down the road, after I get more knowledge, I'll probably go back to Chase."

— *Kathleen Melymuka*

THE BATTLE OF THE MILLENNIUM: CIOS VS. LAWYERS

PAUL A. STRASSMANN

CIOs of the world, beware! The year 2000 legal manhunt has begun. The traps have been laid, the hinges of litigation have been oiled and a posse of lawyers is rehearsing how to bag the catch.

Nothing, not even the so-called year 2000 Good Samaritan Act, can prevent a litigator from transforming a year 2000 incident into class action, directors' negligence, professional liability, breach of contract, warranty claims and misrepresentation suits. And believe me, there are law firms that will rise to the occasion.

After years of talking mostly to CIOs, I recently addressed a meeting of lawyers gathering to discuss year 2000 issues. What a difference from those cozy, chatty IT conferences! The lawyers' conclave was like a tank commanders' briefing just prior to an attack. Each presentation was sharp, with the full text available. The arguments were documented: no fluff; only facts, footnotes and cases. It's easy to predict who will prevail. The lawyers have scouted the terrain and have zeroed in on their targets.

Meanwhile, the CIOs are counting — as usual — on emergency fixes, instant improvisations, tolerance of unfulfilled promises and budget increases to save their butts.

That won't do this time. Look what the lawyers have cooking:

PRODUCT LIABILITY CLAIMS: Lawyers have started collecting information, including advertising copy, technical manuals, press releases and "bug" postings from online bulletin boards to demonstrate that suppliers had early knowledge of potential year 2000 malfunctions.

OFFICERS' AND DIRECTORS' LIABILITY: Legal counsel is now asking when management first learned that its computer systems could be noncompliant. If there's a failure, lawyers will argue that every day that passed was a missed opportunity for directors to perform their duty. Testimony from former employees and copies of warning memoranda will be especially damaging under such circumstances.

BREACH OF CONTRACT AND WARRANTY CLAIMS: Lawyers realize that year 2000 suits will involve multiple litigants. If A sues B, B will sue C so that C can recover damages from A. Meanwhile, legal fees are incurred at each step. It was clear from the meeting that lawyers are ready for prolonged confrontations.

FRAUD AND MISREPRESENTATION: If all else fails, parties will be sued for falsification of information. Jinxed employees will point fingers at overoptimistic project schedules and euphoric claims about reliability — conditions that are chronic in the computing profession, especially among managers. Lawyers already understand that this is an exploitable weakness that plays well under cross-examination of witnesses. Consultants and outsourcing firms will be particularly vulnerable if they made representations that turn out to be unsupportable puffery.

INSURANCE CLAIMS: When everything else fails, reach into the pockets of insurance carriers. The insurance commissioners in most states have ruled that the carriers can exclude year 2000 coverage. When such an exclusion is written at policy renewal time, it could imply that it must have been included to begin with. I listened to an inconclusive argument between two lawyers about that.

INCRIMINATING EVIDENCE: Class-action lawyers will hire private investigators (who were present at the conference) to dig up damaging documents from disgruntled employees and programmers. Often, this will be done outside the usual discovery process to find new lines of inquiry to strengthen the plaintiff's case.

MANAGEMENT IMPLICATIONS: Blaming programmers for the year 2000 glitch won't stand up in court. The omission of two digits has never been purely a coding problem or a cost-saving measure. Making trade-offs among profits, investments, operating priorities and quality requires the full engagement of top management — in particular the CIOs.

But I don't see any indication that computer people are ready to explain how and why the year 2000 problem happened and how similar problems can be avoided in the future. In fact, the computer folks don't yet understand the legal traps that will snare them or realize that the year 2000 lawsuits will bring in their wake far closer executive oversight of the IT function than we've known to date.

CIOs will learn the simple truth that who pays and who goes to jail are what legal disputes are all about. Everyone should understand that corporate officers and directors will surely not wish to assume any blame as year 2000 defendants.

What an irony! Of all people, it will be the lawyers who finally teach the IT profession how to provide quality software. They will be paid well for teaching what could have been mastered much less expensively years ago. □

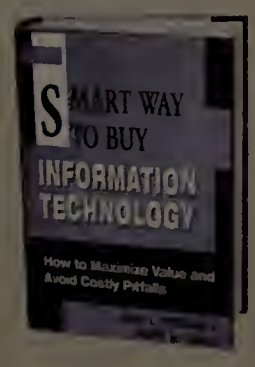
Strassmann (paul@strassmann.com) *served as a computer executive for more than 30 years and was able to avoid litigation for that entire period. He doubts if any 21st century CIO will be able to make that claim.*

RESOURCES: FOR IT MANAGERS

The Smart Way to Buy Information Technology
by Brad L. Peterson and Diane M. Carco
Amacom Books, New York (253 pages, $35 hardcover)

IT managers will find this book highly informative — and slightly entertaining. Peterson and Carco have written a valuable and detailed view of all sides of the information technology procurement process.

The authors draw upon complementary backgrounds. Peterson, an attorney, is a former computer programmer and an ex-marketing representative at IBM. Carco is a financial officer for IT at a large financial services company. The book sets the tone from the beginning with an "us vs. them" theme, hitting IT vendors over the head for pushy sales tactics, such as "bait-and-switch" and the "partnering" ploy. Although the authors acknowledge some "real" vendor/user partnerships, they pour some cold water on the practice, saying that it "gets you to buy products on bad terms."



Readers will want to focus on Chapter 7 ("Negotiating"), where the advice can help companies shape strategies that can get them the best deals. The authors' chief messages here: Search out every opportunity to seize the offensive in negotiations, and make sure your negotiating team speaks with one voice.

One mild criticism: Peterson and Carco engage in a little hype of their book in a couple of spots.

But the bottom line: An IT manager can get a lot out of this work, especially if some key buying decisions loom on the horizon.

— Rick Saia

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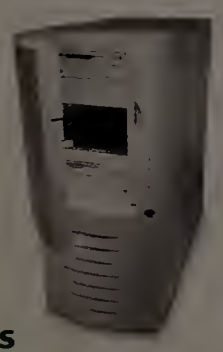

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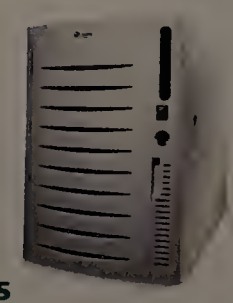

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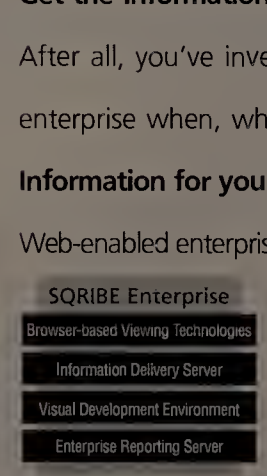

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Review Center

Flashback '98

Tech review

The NT wait, the Linux boom, the Palm vs. CE and the move to ERP. They were among the trends, buzzwords and techno-flak in 1998. And, know what? They will be hot in '99, too. Here's a look at eight key issues from last year and a sneak peek into what you might expect in the year ahead

BATTING (WINDOWS) 2000

Another full year of waiting for the successor to Windows NT 4.0 has passed, and in all likelihood, we are still a year away from the final product, analysts say.

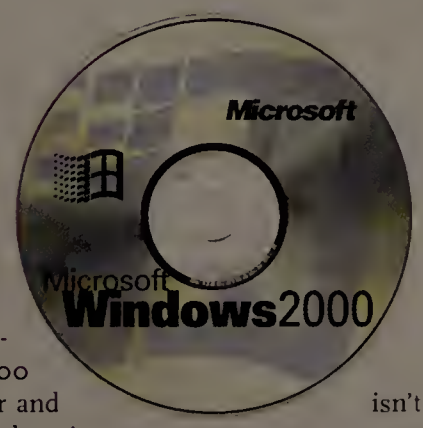
THE NAME GAME

Aside from the August release of its second beta, last year's most notable NT 5.0 news was its name change to Windows 2000. Why the change is unclear. Whether Microsoft Corp. is trying to disassociate itself from NT's reputation as an unreliable operating system or whether it hopes people will lose track of how late NT really is has little bearing on the importance of Windows 2000. According to 200 large user sites surveyed by *Computerworld*, the percent of applications served by Windows 2000 will increase by nearly 13% during the next two years. Compare that with Unix, which is expected to stay even, and Novell Inc. NetWare, which may drop by 10%.

Windows 2000 most certainly will come out in pieces, says Dan Kusnetzky, program director at International Data Corp. (IDC) in Framingham, Mass., a sister company to *Computerworld*. Windows 2000 Professional, Windows 2000 Server and Advanced Server, formerly NT Workstation 5.0, NT Server and NT Server Enterprise edition respectively will likely be delivered in the second half of 1999, he says. The Data Center Server and the 64-bit editions of its pieces won't come out until 2000, he adds.

What has been seen in the betas gives every indication that Windows 2000 will have a profound impact on the way you work. Its primary features include the following:

- The Active Directory that centrally manages all network information and devices.
- Plug-and-play support, which automatically recognizes newly attached devices.
- Compatibility with Windows 95/98, so each will have an upgrade path to Windows 2000.
- The Management Console that replaces multiple utilities with a single interface.



- Support for the Kerberos security system, which has long been used to secure Unix networks.

Analysts say there isn't much users can do to prepare for Windows 2000, "since making decisions about the operating system without its full context usually leads to disaster," Kusnetzky says. Also, there's no rush because most big information technology decisions get based on the database, Web servers and middleware, "which all run fine on NT 4.0," says Jonathan Eunice, an analyst at Illuminata Inc. in Nashua, N.H.

However, Eunice does recommend that users get their systems management in place before Windows 2000 is delivered. "It's very wise to have good mechanisms for software delivery, single sign-on and security in place before the big software change comes down the pipe."

— Kevin Burden

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Flashback '98 Tech review

CONTINUED FROM PAGE 105

LINUX LUSTER

The spotlight is shining on Linux, which has received pages and pages of positive press over the past year. Highlights include announcements of support from application vendors such as Netscape Communications Corp., Informix Corp. and Sybase Inc. and enhanced offerings from Linux-specific vendors such as Caldera Inc. and Red Hat Software Inc.

Indeed, 1998 "could probably be called the year of Linux. It became a market force to be dealt with," says George Weiss, an analyst at Gartner Group Inc. in Stamford, Conn.

One of the key trends in the Linux market in 1998 was the vendor application support promised for it, which analysts say is building user confidence in Linux and opening up additional uses for the freeware operating system. "Oracle and Informix announcing some support was huge," says Bill Peterson, an analyst at IDC.

Up until 1998, Linux users turned to their peers on the Internet for support, Peterson says. Now vendors are taking on a support role. For instance, Red Hat introduced around-the-clock corporate support for Linux systems. Estimates circulating in the industry say there are now 7 million Linux users, a mixture of serious users and experimenters. "Most of Linux is running with Apache and running for serving up Web pages," Weiss says.

However, some users download Linux and don't use it, and not all Linux packages purchased from vendors are used on the server side, which makes it hard to track market numbers.

THE FUTURE

Looking ahead, Weiss says, Linux needs to prove it has staying power. He says there must be consistency from version to version, more availability and better continuity. He also says users want to know whether or not the product can scale.

"They need to know how to get from Point A to Point B to Point C without a massive disruption," Weiss says.

As for what Linux will be used for in the future, Weiss predicts, "There will be pockets of strength." There will be heavy usage in areas of infrastructure functionality such as Web servers and communication protocols — areas where users don't really feel an operating system is a major component.

"It will be a block piece of layer infrastructure," he says.

— Amy Malloy

THE SCOOP ON CHIPS

You probably didn't start out 1998 thinking the year would end with $399 price tags teasing home PC buyers or $10,000 starting prices for four-processor servers.

The wave of vendors driving faster systems into lower price ranges won't break in 1999, according to analysts — but there already are signs that PC pricing may be a little less crazy.

"Pricing has already stabilized a bit in the last two or three months; the corporate market is likely to see smaller price decreases than the consumer does," says analyst George Iwanyc at Dataquest in San Jose, Calif. He says Dataquest expects the sweet spot for corporate PCs to stay in the $1,000 to $1,500 range.

TWO DIRECTIONS

PC chip technology is driving in two directions. First, Intel Corp.'s Pentium II line soared to 450-MHz, and Intel plans to offer a 500-MHz, multimedia-oriented chip nicknamed Katmai in early 1999. Iwanyc expects a first-quarter push into the corporate market by rival chip vendors releasing their next-generation chips, such as Advanced Micro Devices Inc.'s (AMD) 500-MHz K7 and Cyrix Corp.'s 600-MHz Jalapeno.

Meanwhile, AMD and Cyrix should continue to have an impact in the consumer market, where Intel responded in 1998 with its Celeron line of value-priced processors. By the end of 1998, consumers were able to buy 300-MHz PCs for $399 after rebates.

ON THE HORIZON

A key PC development that CIOs should watch for in 1999 is support for the Rambus memory bus interface offered by Rambus Inc. and Intel. In early 1998, vendors released the first PCs to jump from a 66-MHz bus to 100 MHz. Now Rambus — with a raw bus speed of 400 MHz — represents another speed boost, although technical limits won't allow the full 4-to-1 gain, Iwanyc says.

On the server side, Intel extended its Pentium II family with the Xeon line of processors, while bumping delivery of the 64-bit Merced architecture further into 2000.

Yet few people are eagerly awaiting the 64-bit chip. "Merced hype is just that — hype," says Jon Oltsik, an analyst at Forrester Research Inc. in Cambridge, Mass. With corporate buyers living in three-year time frames for their server purchases, Unix servers will continue to handle heavy-duty corporate applications, he says.

In 1999, Oltsik expects still more clock-speed boosts for Xeon; greater support for I2O input/output technology; and a move toward server hybrids, which will allow CIOs to partition multiprocessor servers to support multiple operating systems.

But the speed boosts for Intel servers won't help if CIOs still must wrestle with the limitations of Microsoft Corp.'s Windows NT. "The chip is almost secondary. NT is limited in that you can't run more than one application on one box. So if you bring in one new NT application, you have to bring in a new box. You'll have people who managed five boxes last year managing 12 boxes this year and 20 a year from now," Oltsik says.

— James Connolly

HANDHELD DANDIES

PDAs, handhelds, palmtops, CE device units — whatever you wish to call them — are hot and increasingly going the wireless route, as evidenced by 3Com Corp.'s recently announced Palm VII wireless platform personal digital assistant (PDA).

Trailing a little behind that in hype are the 'tweeners: the larger-format Windows CE Palm Pro portables. They're not quite notebooks or subnotebooks, but they're bigger than handhelds. Here's a quick look at some of the highlights in '98 that set the stage for 1999.

PALM PC HURDLES

When Microsoft Corp. announced the Palm PCs (now called Palm-size PCs) early last year, "they were met with an interesting backlash of, 'Oh yeah, you're just trying to do this to compete for space from [3Com],' " says Jill House, an analyst at IDC. "But the Palm continued to do really well because the Microsoft ones had problems."

The battery life was really low, the screen was complicated, the interface wasn't friendly, and the voice recording was spotty, she says. Four products to date have been announced in this group.

CE PRO CLASS

Formerly known as Jupiter, a new class of devices called CE Pro portables arrived late in 1998. These portables have full notebook-size screens and larger keyboards but are still considered handhelds because they aren't robust enough to handle notebook functionality, according to House.

"I'm pretty disappointed in the CE Pro format," says Ken Dulaney, an analyst at Gartner Group in San Jose, Calif. "The form factor is fine. . . . The problem is Microsoft software. If you were to be a Windows CE user today, what you would find out is that it's not compatible with Windows."

PALM GOES WIRELESS

3Com's recent release of the Palm VII gives users built-in wireless access. "For the first time, you have the convergence of a couple of things: a popular device, the integration of wireless that has decent coverage in a popular device and a very major effort to provide Web content to that device," Dulaney says. "You still have to pay $800, you've got to pay a monthly fee, and the architecture is proprietary to 3Com, although it does give you Internet access. "But I think it probably has as good a shot as any in trying to kick-start wireless data, which has been a languishing industry."

THIS YEAR'S OUTLOOK

Dulaney says he expects 1999 to be the year of maturation. "For example, the Palm and the CE devices will probably get color screens. We'll see more horsepower, more memory and more capabilities put into them."

"The announcement of the Palm VII, being a wireless platform, clearly indicates to us the wave of the future," says Gerry Purdy, president of Mobile Insights Inc. in Mountain View, Calif.

— Cathy Gagne

BROWSERS: HERE'S LOOKING AT YOU

Though it may not feel like it, a lot more than the Microsoft Corp. antitrust lawsuit went on in the browser market last year. Netscape Communications Corp. gave away the source code to its browser. America Online Inc. purchased Netscape. Extensible Markup Language (XML) became a standard. A more intelligent browser emerged — browsers became more aware of the portals that feed them. Netscape Navigator 4.5 was released, and a beta of Internet Explorer 5.0 hit the market. Whew.

Handheld PCs

DEFINITION: Small computers designed to fit in a person's hand. They are battery-operated and use a keyboard or pen as an input device. There are two groups of handheld PCs: standard handhelds and expandable organizers.

CODE OFF-LOAD
Locked in a bitter rivalry with Microsoft and its Internet Explorer, Netscape gave away the source code to its Communicator browser. It did that to encourage innovation from third-party developers, says Ted Schadler, director of software services at Forrester Research. Analysts say that move put Netscape in a difficult financial situation, which explains the AOL acquisition.

XML STANDARD
A standard was approved for XML, a language which was intended to help define and share document information over the Web. It's going to be more popular on servers than on browsers, says Mike Gotta, an analyst at Meta Group Inc. He says that's because it's easier to control servers, and the big value right now is in data exchange. The benefit on the browser will be more precise searches.

BROWSER ADVANCES
Product releases included Navigator 4.5 and a beta of Internet Explorer 5.0 — which should ship in the first quarter of this year. With those new versions, browsers have become more aware of the portals that feed them, Schadler says.

For instance, Navigator looks back to Netscape Netcenter to find sites. Schadler calls that "tethering," where a connection persists between the browser and the portal. Microsoft also has tethering, but won't exploit it the way Netscape will, he says. He expects Microsoft to rely on third parties to do that.

AOL ACQUIRED NETSCAPE
"The single most important event in the browser market was AOL's acquisition of Netscape," says Andrew Bartels, an analyst at Giga Information Group in Norwalk, Conn. AOL provides a funding source for the continued enhancement and development of Navigator, thus improving the chance of Navigator's survival, he says.

AOL won't replace Explorer with Navigator in its AOL product in the immediate future. Instead AOL will start to promote and push Navigator in non-AOL branded sites and services, Bartels says.

THE FUTURE
Watch for browsers to become more logical and intelligent, analysts say. Browsers will incorporate more server-side functionality.

For example, the browser will be extended on the client to an application administration environment, such as document management on the browser, Schadler says.

He calls that the Internet desktop. And browsers will start to show up on other devices such as set-top boxes, he says. Browsers in general will become more aware of the portals that feed them, he says.

Into next year, Explorer will continue to have the tremendous momentum of being the installed browser that comes with Windows, Bartels says.

But with the backing of AOL, "Navigator will give Microsoft more of a fight for the browser market share of new installations of browsers and is likely to bolster the Netscape usage patterns of customers who have both browsers," Bartels says.

— Amy Malloy

DATA WAREHOUSE SUITE STAKES

In 1998, database management system vendors announced products that let you crunch more data, faster, yawn . . . Wait a minute, they actually did something different, too. Their data warehousing tool suites opened some eyes.

"This was the year it finally happened. The important part of these is that they're integrated with the vendors' management tools. So, the basics are there to build, manage and query a data warehouse," says Bob Craig, an analyst at Hurwitz Group Inc. in Framingham, Mass.

Most of the major DBMS vendors have refreshed their core products in the past year or so. The most recent developments were the fall announcements of Microsoft Corp.'s SQL Server 7 and Oracle Corp.'s Oracle8i.

SQL Server 7, scheduled for general availability by the end of last month, was pitched as a key step in moving Microsoft's database product beyond the workgroup and department level and into the enterprise level.

It features increased capacity, row-level locking, new management tools and online analytical processing capabilities, which may help to position it for data warehousing uses.

Oracle is promoting Oracle8i as an Internet-oriented database, making greater use of technologies such as Internet programming language HTML and a database-resident Java virtual machine. It too was due for shipping by year's end.

WAREHOUSE? (THERE HOUSE)
However, Craig sees the improvement and integration of data warehousing tools as key developments in the market. He says the offering of integrated suites of tested warehousing tools will help user organizations get over a major hurdle in implementing data warehouses. "In the past, you had to go to different vendors. If you were building a data warehouse, you were the integrator or you had to hire an integrator," he notes.

This year, don't look for major releases of the core database engines, Craig says. However, he says information technology managers should watch for developments in the growing vendor and user support for meta data at the enterprise level, giving managers a more integrated look at data across varied applications.

— James Connolly

SCOPING OUT ERP

The event that affected the enterprise resource planning (ERP) market arguably more than any other in 1998 was SAP AG's announcement that it plans to build a supply-chain-planning product called SCOPE.

The announcement was made in September 1997, but "it effectively froze the market in 1998, which makes it the biggest announcement of the past year," says David Dobrin, a senior partner at Benchmarking Partners in Cambridge, Mass.

SCOPE — Supply Chain Optimization, Planning and Execution — is part of SAP's New Dimension platform, an integrated suite of business intelligence products that, when completed, will address business scenarios from sales force automation to managing customer relationships.

With the announcement, SAP got away from its single database model. "That in itself is news, but the effect that the announcement alone had on the market makes it one of the biggest stories of the year," Dobrin says. "SAP essentially stopped a number of supply-chain-planning companies dead in their tracks — and [it] hasn't even come out with a product yet."

The competitor hit hardest probably was Manugistics Inc. in Rockville, Md. "Immediately after the announcement, their sales were delayed," Dobrin says. The other major ERP vendors — Baan Co., PeopleSoft Inc. and J. D. Edwards & Co. — all have entered the supply-chain market through acquisitions.

SAP is the only member of that group saying it will build its supply-chain product from scratch.

Also in the coming year, expect ERP vendors to make customer relationship management systems a top priority. The transaction system at the core of ERP systems already records customer interaction data, but turning that data into customer insight hasn't been possible.

That will change: Oracle Corp., Baan and SAP all have been busy acquiring companies and technologies to bolster their customer analytical systems. Actual products may not be seen for a couple of years, but that's where a good deal of the vendors' attention will be.

— Kevin Burden

WEB WATCHING

Headlines last year were abuzz with Web application announcements: "Oracle dives into Java," "Tools provide Web access to databases," "Sybase unwraps development tools," "Big iron gets a case of Web fever," "ESuite developer's pack ready to roll." The Web is omnipresent, and vendors will continue to react this year.

"What the concept of a Web application does is it allows users to have a more customized experience" on Web sites, says Ron Rappaport, an industry analyst at Zona Research Inc. in Redwood City, Calif. Companies will need to adapt their approach to Web site construction accordingly and use tools that are database-aware and so forth, he says. "Look at a company like Oracle that has Internet-enabled its product line."

Web development tools rushed in at the beginning of last year, and according to analysts, we will see more results from those tools this year in the form of new applications on Web pages. "The reality is that there are going to be more Web sites in '99 running off databases," Rappaport says. "Oracle is going to be the big boat on that riding tide."

He adds that "you've got to create sites with the foreknowledge that the database is sewn into interactivity at the site rather than just relying on applets. . . . That database is part of the site that gets tapped and touched regularly."

As companies start to use the Web as a channel for supporting a wide variety of customer, supplier and employee interactions, the task of integrating Web front ends with existing back-end systems will continue to be a major theme this year, says Andrew Bartels, an analyst at Giga. But he emphasizes that "the issue is not at the front end/Web interface, it's the integration of that interface" itself.

Bartels also says we will see Web sites becoming more "customer friendly — making doing business easier, more intuitive, faster, simpler and more secure."

"The type of Web applications you're going to see in '99 in the commerce arena won't simply focus on allowing a user to consummate a transaction, but rather to engage in the transaction that is linked to other Web sites," Rappaport says.

That will be the year "when E-commerce doubles or triples in dollar volume," and the number of companies with significant Web presence will grow two to three times, Bartels says.

But underlying all the viability and effectiveness of Web applications will be the adoption and embracement of XML, Rappaport says. "XML is a branch of HTML that has a few core tenants that will make it very valuable, very soon. The benefits of XML: It's a standard, and it's extensible. Anyone who extends it. extends it as a standard."

— Cathy Gagne

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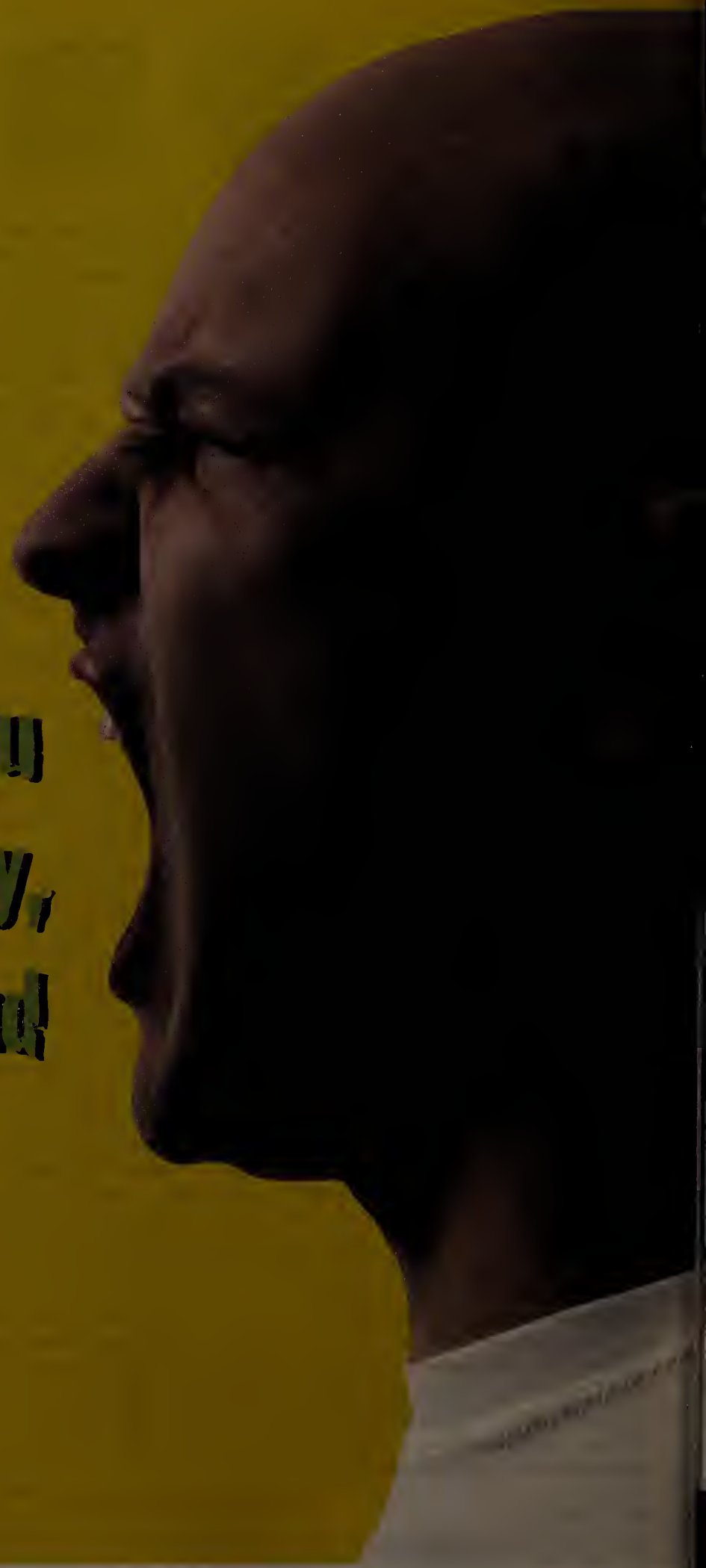

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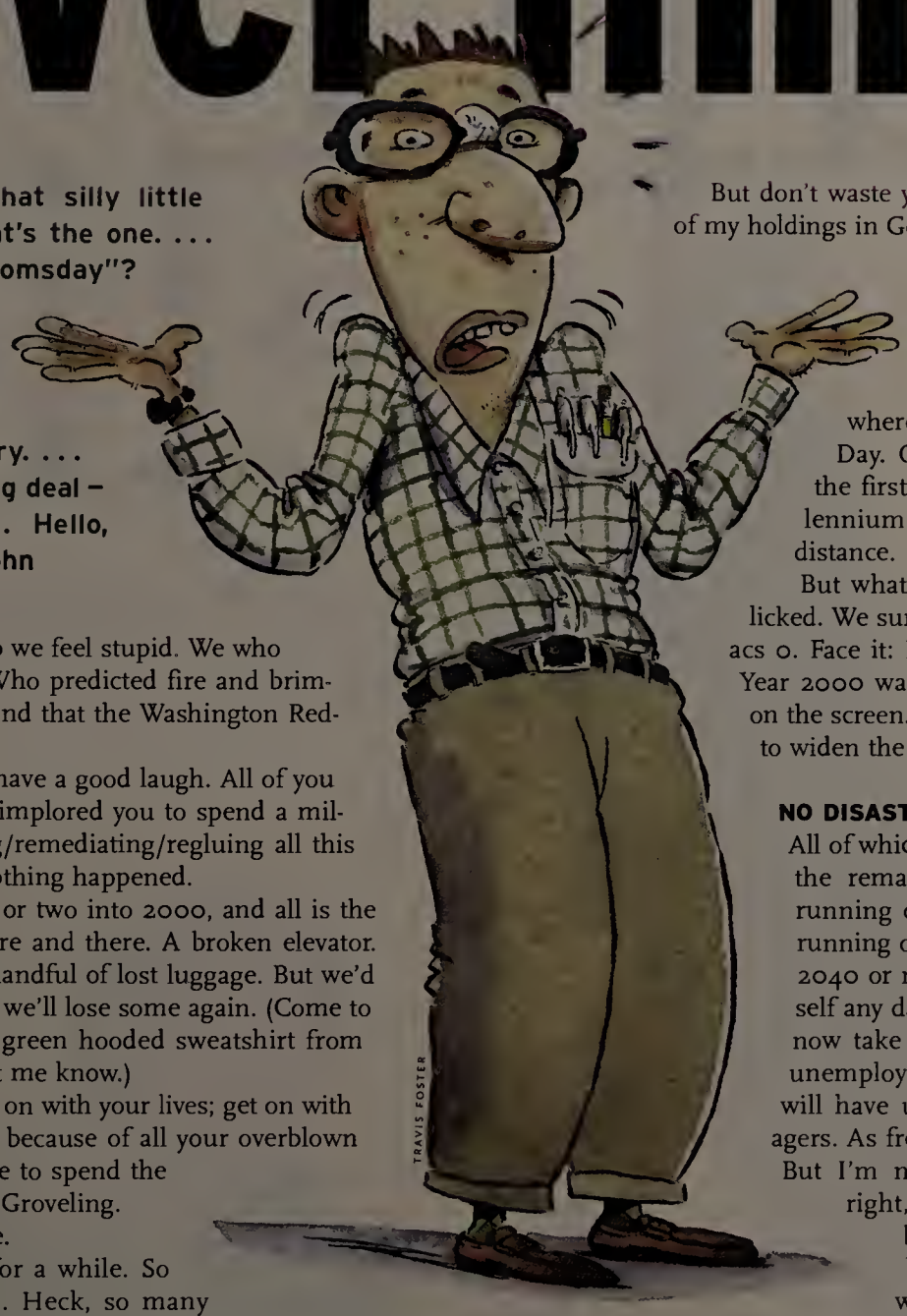
In Depth

YEAR 2000: Never mind!

Hello, Boss? Remember that silly little Y2K matter? . . . Yeah, that's the one. . . . Oh, did I really call it "doomsday"? Are you sure I asked for that many millions? Well, I'll be danged. . . . Well, here we are in 2000 and everything's hunky-dory. . . . Yeah, turns out it was no big deal — can you believe that? . . . Hello, Boss? Boss? By Michael Cohn



IT'S JANUARY 2000 AND, BOY, do we feel stupid. We who whined about the year 2000. Who predicted fire and brimstone. And gloom and doom. And that the Washington Redskins would go 14-2.

Go ahead, all you naysayers, have a good laugh. All of you folks who listened to us as we implored you to spend a million or 40 renovating/replacing/remediating/regluing all this year 2000 stuff . . . and then nothing happened.

Because here we are, a week or two into 2000, and all is the same. Sure, we had a glitch here and there. A broken elevator. Traffic signals on the blink. A handful of lost luggage. But we'd lost luggage aplenty before, and we'll lose some again. (Come to think of it, I'm still missing a green hooded sweatshirt from 1994. If anybody has seen it, let me know.)

So you folks go ahead and get on with your lives; get on with the work you postponed in '99 because of all your overblown millenniprojects. But me, I have to spend the rest of this month eating crow. Groveling. Removing the egg from my face.

To be fair, it did look ugly for a while. So many companies were behind. Heck, so many *countries* didn't have a clue. CIOs were convinced that the thing was a hoax and that 25 million lines of RPG code could be regression-tested in a weekend. I was sure a crash-and-burn was imminent.

That's why I bet my career, my fortune — the whole enchilada — that you'd be reading this by candlelight. I gave up a great job making thirty-eight five. I jettisoned the Dow at 6,500. Now it's poised to hit 15,000, and all I've got left is a few hundred shares of year 2000-related stocks, which, all told, couldn't buy one item at the local everything's-a-buck store.

I was sure the Department of Defense would screw up. I was sure Los Angeles would screw up. I was sure the FAA would screw up. But the only date-related failure was a microwave on a flight to Fresno that overzapped portabella ravioli and turned them into little pasta pellets.

I was wrong. So sue me.

Whoa, whoa — don't get too literal on me there! Although I have to admit it's a safe bet *somebody* will sue *somebody*, this being America and all. The thousands of year 2000 lawyers who now have no plaintiffs, no litigation and no megabucks lawsuits surely will go after some poor schlub; it would be too hard for them to get back into ambulance-chasing shape after spending three years blathering to one another at conferences.

But don't waste your time with me. I stuck most of my holdings in Gold American Eagles back in '98, and now they're probably selling for less than $200 an ounce. If not a pound.

All is not lost. Catastrophe may still be out there, somewhere. I could still hold out for Leap Day. Or 10/10/2000, which is either the first true eight-digit date of the millennium or a cheap way to dial long distance.

But what's the use? We've got this thing licked. We survived. World 1, Millennichondriacs 0. Face it: Big projects are a piece of cake. Year 2000 was a cinch. The euro? Just a blip on the screen. And I hear they're getting ready to widen the Chunnel.

NO DISASTER, NO RICHES

All of which now kind of puts a damper on the remaining bleak scenarios such as running out of phone numbers in 2025, running out of Social Security numbers in 2040 or running out of Social Security itself any day now. We Chicken Littles must now take our sorry keisters down to the unemployment office and see if anyone will have us. As coders. As project managers. As french friers.

But I'm not bitter. Honest. Had I been right, my bank balance would today be a negative number. I wouldn't be able to start my car. My power would be off. There would be looting, rioting and no presents under the tree. But instead, it's back to the store for me. To return my camping stove. And the 85 containers of propane. And the 40 cases of generic tuna, which is not even the solid white kind but rather the dark, oily stuff with lots of little gray pieces of whale. Or seaweed. Or whatever.

The next millennium beckons. Full of promise. Full of wonder. Off we go. For those who endured my centurial sermons in 1997, 1998 and 1999, thanks for listening. I was wrong. It's better this way. I didn't get to say, "I told you so." I didn't make a million in code conversion. I didn't sock away a fortune on some patent to cram four digits into two by turning them sideways. I can return to life as I once knew it and get back to all the boring stuff that wasn't deemed mission-critical — the piles of documentation and junk mail that have been gathering dust since, oh, late '97 or so.

The hype is over. Year 2000 came and went. And with it went my once-in-a-lifetime opportunity to make a bundle. Alas, maybe something else will come along. But in the meantime, if anyone wants to buy a Year 2000 Countdown Clock, please let me know. □

Cohn was a year 2000 consultant and now would be happy if his headhunter would just return his calls.

Jobs Forecast '99

Pain Relief

IN 1999, IT PROFESSIONALS WILL STILL BE IN HIGH DEMAND, AND DEPARTMENTS WILL CONTINUE TO SUFFER LABOR PAINS. BUT SOME FOLKS HOLD OUT HOPE THAT THE DARKEST DAYS OF THE SKILLS CRUNCH MAY BE COMING TO AN END

BY BRONWYN FRYER

IT'S LIKE a recurring nightmare. When hiring managers and information technology recruiters look into their crystal balls for 1999, much of what they see is the same bad news. The tight labor market of the past few years will continue, they predict, and companies will keep working overtime to attract, hire and retain skilled technology workers.

But despite the gloom and doom, some observers are noting a slight easing of tension, particularly as year 2000-related repair work winds to a conclusion. "My sense is that the job market is cooling off a little bit," observes CIO John Keast at PG&E Corp. in San Francisco.

Keast gets this first whiff of a change in the skills climate from salary caps: Even in expensive, fast-paced West Coast territory, where a senior programmer can earn between $70,000 and $100,000 annually, "we're finding that we're not having to bump up against our upper levels for salary offerings quite as often," Keast says.

Computerworld's annual hiring survey bears out Keast's observation. In the 1997 survey (a forecast for 1998), 86% of participants said the difficulty of locating and hiring has resulted in an increased load on existing staff; in the 1998 survey, that percentage had dropped to 84%. Sure it wasn't a huge drop, but even a slight drop spells major relief in this market.

In fact, of the major impact areas from the IT skills shortage, hiring managers said things were slightly better on all counts. In the 1997 survey, 80% of those surveyed said that the hiring crunch had resulted in project delays; in the 1998 survey,

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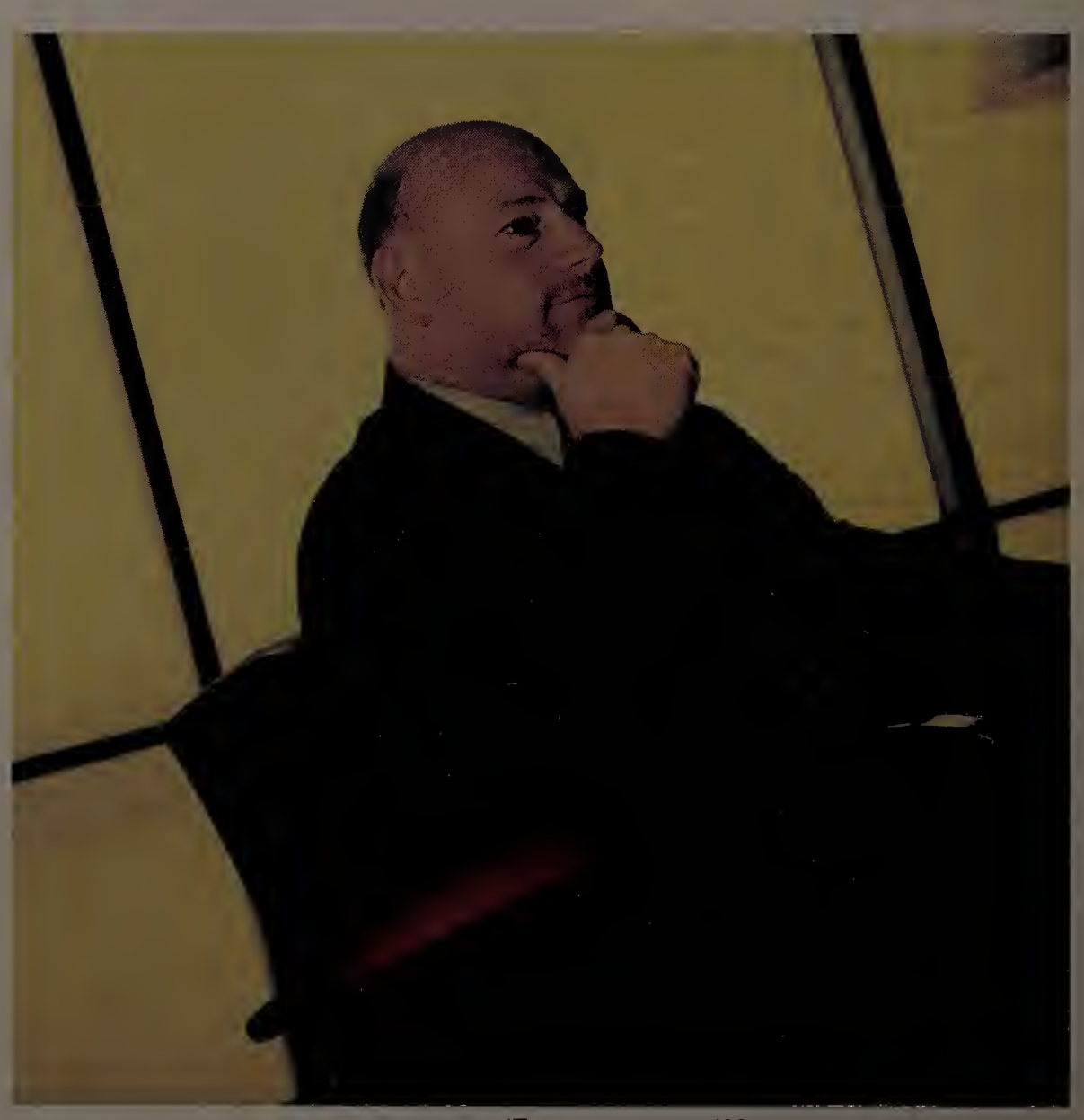

PG&E CIO JOHN KEAST PREDICTS A SLOWER IT JOB MARKET IN '99

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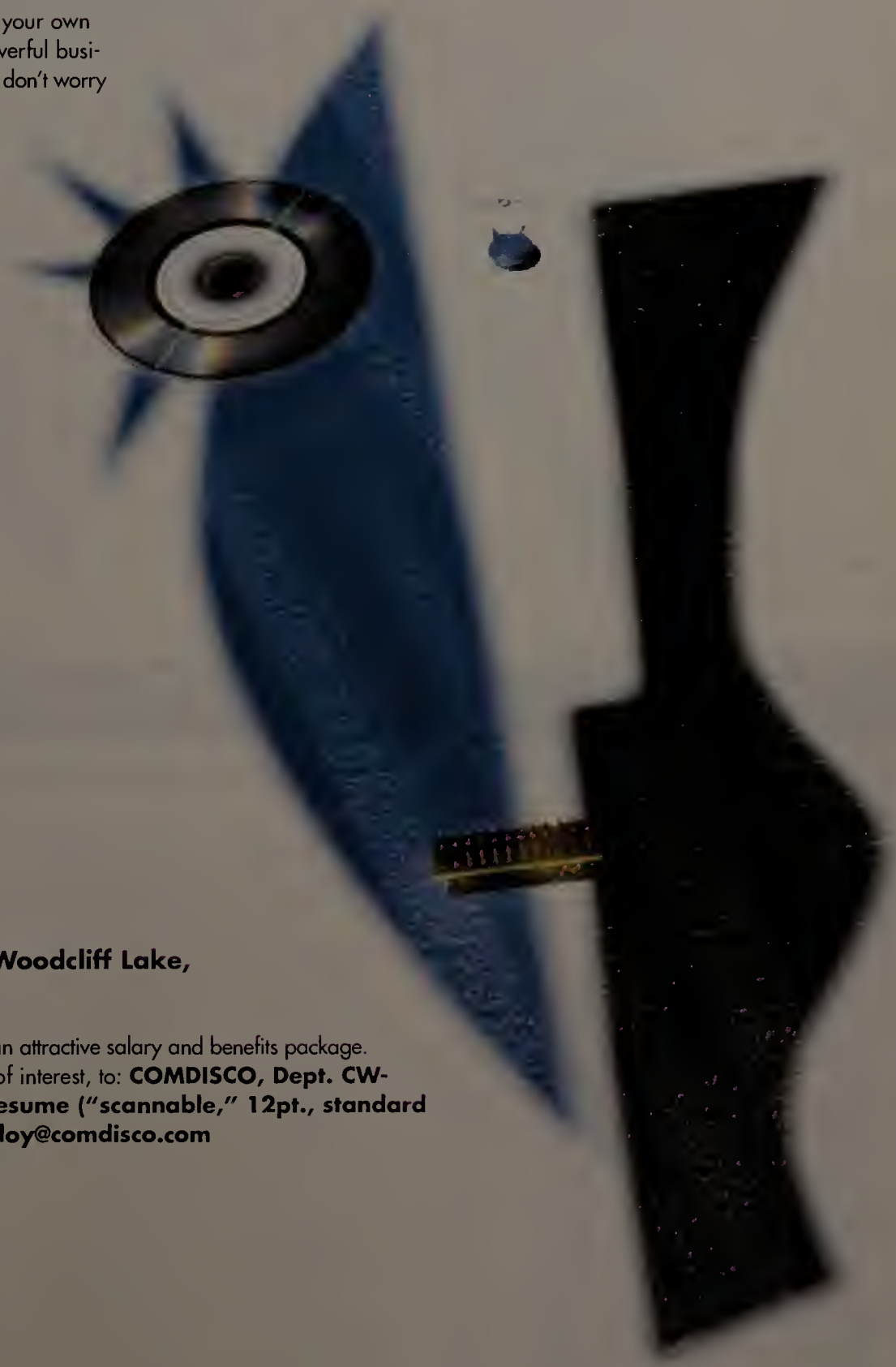

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CONTINUED FROM PAGE 110

that number dropped to 66%. And although 58% of survey participants said they had to spend more time on recruiting in the 1997 survey, 57% made the same claim in the 1998 survey.

The hiring situation remains dire, to be sure. But the forecast for 1999 shows that relief may be on the way. The reasons for the slight cooling aren't yet clear, but some observers venture educated guesses.

Paul LeFort, CIO at Minneapolis-based health care giant United Wisconsin Services Inc., said that, as companies that started early begin to wind down their year 2000 conversion projects, new resources should become available.

"We're in reasonable shape for Y2K, and with the freed-up resources, we think we will pick up a year for development that will give us a jump on the competition," LeFort says.

Others think that the passage of H-1B visa status for IT workers from overseas may be helping. "The pool is beginning to be filled by foreign workers," says Mike Petosa, chief technology officer at Pencom Systems Inc., a national IT recruiting firm. "The government's step to bring in people with specialized talents will help ease the stress."

Difficult at best

Nevertheless, the frustration remains widespread. Just ask Heinz Bartesch, an IT recruiter at San Francisco-based Professional Consulting Network, which serves large and small companies around Silicon Valley. Bartesch has been working at full capacity for two years to meet an unending flood of demand, particularly for those with enterprise resource planning (ERP) skills.

"I just can't work enough to satisfy my clients," Bartesch says. "I'm making a ton of money, but I never see my wife and kids."

IT organizations all over the country are continuing to beat the bushes for hard-to-find specialists in Oracle, Windows NT, network administration, project management and Unix and Cobol programming.

Skills related to network and Internet technology remain hot: 40% of hiring managers are looking for people with a background in HTML, the Web programming language, followed by Internet development (38%), Windows NT Server (37%), Java (35%) and TCP/IP (32%).

Although the percentage of respondents reporting that they relied on contractors or temporary help to make ends meet fell in the 1998 survey to 60% from 63% the year before, the situation remains problematic for outsourcing firms, Bartesch says.

"Professional services firms are crying out for help, too," he says. "The Big Five are turning away business because they still don't have the staff to handle the work."

"The situation is difficult at best," confesses Rob Friedlander, a recruiter at IT consulting firm KPMG Peat Marwick LLP.

"We're trying to get smarter about how we hire, we're offering more money, and we want to make the hiring

GOING FOR THE GOLD AND THE GLORY

The same two reasons top the list of why IT staffers leave, their managers say, but opportunity for advancement has risen in the rankings:

74%	Compensation
73%	Advancement

IT'S GETTING BETTER, BUT NOT MUCH

While it's still tough recruiting IT talent, it may be easing a bit, according to the impacts reported by IT managers.

IMPACT OF SKILLS SHORTAGE:	'98	'97
Increased workload on existing staff	84%	86%
IT projects were delayed	66%	80%
Increased salary level for new IT hires	63%	66%
Hired temporary or contract personnel	60%	63%
Spent more time on recruiting	57%	58%

Source: All charts from *Computerworld*'s Annual Jobs Forecast Survey of 400 IT managers

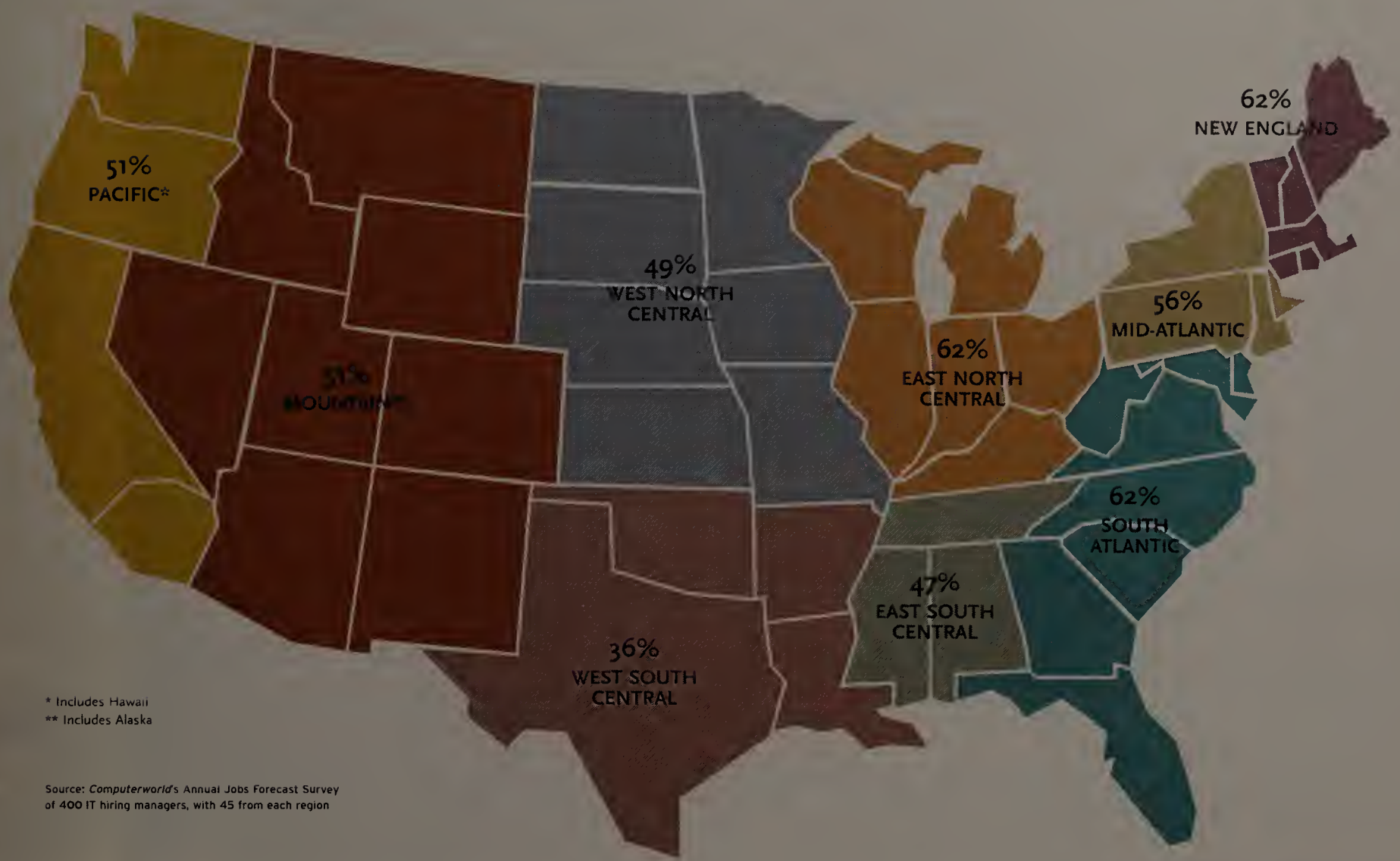
THE TOP IT JOBS FOR 1999

Rankings, by title, of jobs that IT hiring managers say will be most in demand, by region

PACIFIC	MOUNTAIN	WEST NORTH CENTRAL	WEST SOUTH CENTRAL	EAST NORTH CENTRAL	EAST SOUTH CENTRAL	SOUTH ATLANTIC	MID-ATLANTIC	NEW ENGLAND
1. Network administrator	1. Senior programmer/ analyst	1. Programmer/ analyst	1. Network administrator	1. Network administrator	1. PC technical support specialist	1. Project manager	1. Network administrator	1. Network administrator
2. Project manager	2. Webmaster/ Web designer	2. PC technical support specialist	2. PC technical support specialist	2. Senior systems analyst	2. Network administrator	2. Senior programmer/ analyst	2. Senior programmer/ analyst	2. PC technical support specialist
3. PC technical support specialist	3. Senior systems analyst	3. Network administrator	3. Programmer/ analyst	3. Project manager	3. Senior programmer/ analyst	3. Senior systems analyst	3. Project manager	3. Programmer/ analyst
4. Senior programmer/ analyst	4. PC technical support specialist	4. Webmaster/ Web designer	4. Project manager	4. PC technical support specialist	4. Programmer/ analyst	4. Network administrator	4. PC technical support specialist	4. Project manager
5. Programmer/ analyst	5. Programmer/ analyst	5. Senior programmer/ analyst	5. Senior systems analyst	5. Senior programmer/ analyst	5. Project manager	5. PC technical support specialist	5. Senior systems analyst	5. Senior systems analyst
6. Senior systems analyst	6. Project manager	6. Project manager	6. Senior programmer/ analyst	6. Programmer/ analyst	6. Webmaster/ Web designer	6. Programmer/ analyst	6. Programmer/ analyst	6. Senior programmer/ analyst
7. Computer operator	7. Technical support manager	7. Senior systems analyst	7. Webmaster/ Web designer	7. Webmaster/ Web designer	7. Senior systems analyst	7. Webmaster/ Web designer	7. LAN manager	7. Webmaster/ Web designer
8. Webmaster/ Web designer	8. Computer operator	8. Technical support manager	8. Technical support manager	8. LAN manager	8. LAN manager	8. LAN manager	8. Computer operator	8. Technical support manager
9. Technical support manager	9. Network administrator	9. LAN manager	9. Computer operator	9. Computer operator	9. Computer operator	9. Technical support manager	9. Lead computer operator	9. Computer operator
10. Computer operations manager	10. Computer operations manager	10. Manager of Internet technology	10. Manager of Internet technology	10. Technical support manager	10. Technical support manager	10. Computer operator	10. Technical support manager	10. Computer operations manager

THE BEST JOB MARKETS

The number of hiring managers expecting to increase their IT staffs in the coming year has risen by as much as 17% in some regions. Here are the percentages of companies expecting to increase IT hiring in 1999:



* Includes Hawaii
** Includes Alaska

Source: *Computerworld*'s Annual Jobs Forecast Survey of 400 IT hiring managers, with 45 from each region

process as short as possible. But I don't think anything is going to change much."

Get what you pay for

For 1999, the quality of IT recruits remains a vital issue. Some observers feel that many IT hiring managers mistake paper for professionalism, preferring to hire inexperienced folk with certificates or spanking-new degrees. "I know companies that are pulling in a lot of MBAs with very little computer background," says Frank Olivas, a senior consultant and ERP specialist at Indus International Inc. in Atlanta. "You can have a Ph.D., but it means nothing if you haven't seen the different flavors of Unix."

Keast agrees, adding that finding people who can focus on IT and business "is not getting any easier." He's desperately seeking people with a solid understanding of both technology and business, who with some experience under their belts are worth far more than legions of inexperienced collegiates.

"I'll take any good, experienced project manager that comes our way," Keast says.

The perceived shortage of talent is keeping salaries high. In 1998, high salaries remained a chief tool that companies used to reel in recruits: 74% of managers reported that the primary reason for staff turnover is "compensation." Accordingly, it's no surprise that 83% of hiring managers surveyed say they expect salaries to increase in 1999.

Skyrocketing salaries have made life especially hard on organizations that lack the funds to compete. Bill Branch, director of the 120-person department of computer services and telecommunications at the University of Central Florida, says he has spent two years searching for someone to do LAN and WAN administration for the school. "I've been trying to adjust salaries to attract the types of people we need, but it's been very difficult," he says.

And despite the comfortable university environment, Branch says it has been tough to hold on to people. "Just today, I had one employee resign," he sighs. "He was offered a $14,000 increase plus a 4% bonus if he stayed a year."

Aside from its seductive value, money is also being used as a means to keep people from job-hopping. Olivas received more than 70 telephone calls from recruiters before he accepted a new job at Indus, a midsize firm that builds software for the utility industry. Some companies, he says, resorted to misleading advertising. Olivas recalls that one firm had touted a $100,000 signing bonus for IT professionals. "I went to their home page and found out that the bonus was to be spread out over three years, presumably to keep you there," he says.

Think differently

But money isn't everything. Many companies have already learned that quality of life is becoming at least as important as money in reeling in skilled personnel.

One characteristic that attracted Olivas to Indus was its creative compensation package for IT professionals who must travel. Olivas receives equivalent time off for every day he spends away. "When you're on the road so much, having extra time away from work is a real benefit," he says.

United Wisconsin creatively increased what LeFort calls the IT "gene pool." One unusual internal training program, the United Wisconsin University, offers "try before you buy" IT courses to employees in other, nontechnical departments such as sales. "One night a week, they get a primer course on systems; if they're interested, they can enroll in the real program," LeFort explains. So far, the investment in training has paid off. This year, he predicts, "We'll still be in the middle of a dogfight to find the 400 best people, but I like our odds." □

Fryer is a freelance writer in Santa Cruz, Calif. Her book, The Unofficial Guide to Buying a Computer, *will be published in 1999 by Macmillan Publishing USA, a Simon & Schuster company.*

THE SKILLS THEY WOULD KILL FOR

IT managers say the following are the skills they most want but have the hardest time finding:

- 24% Oracle
- 20% Microsoft Windows NT
- 16% Network administration
- 12% Project management
- 11% Unix
- 10% Cobol
- 10% Database administration
- 10% Network management

TOP SLOTS FOR CONTRACTORS

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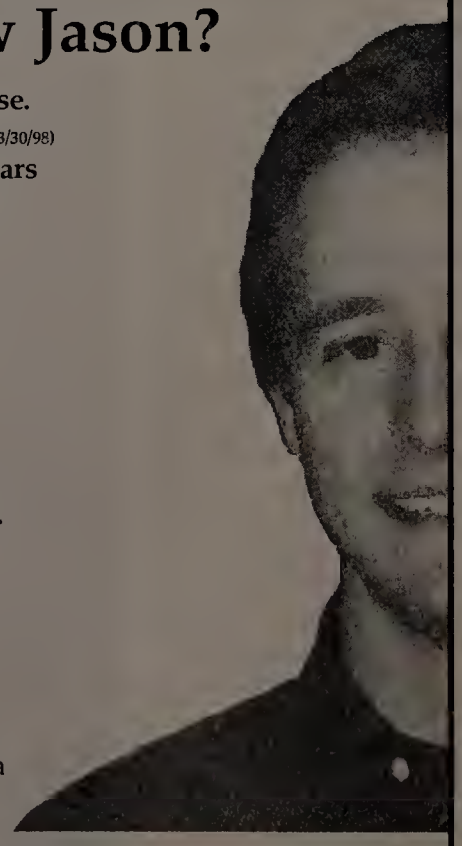

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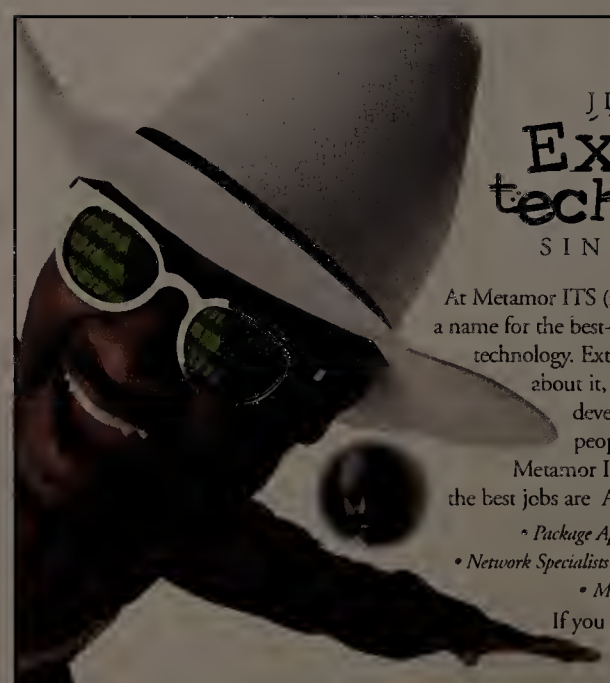

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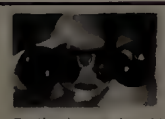

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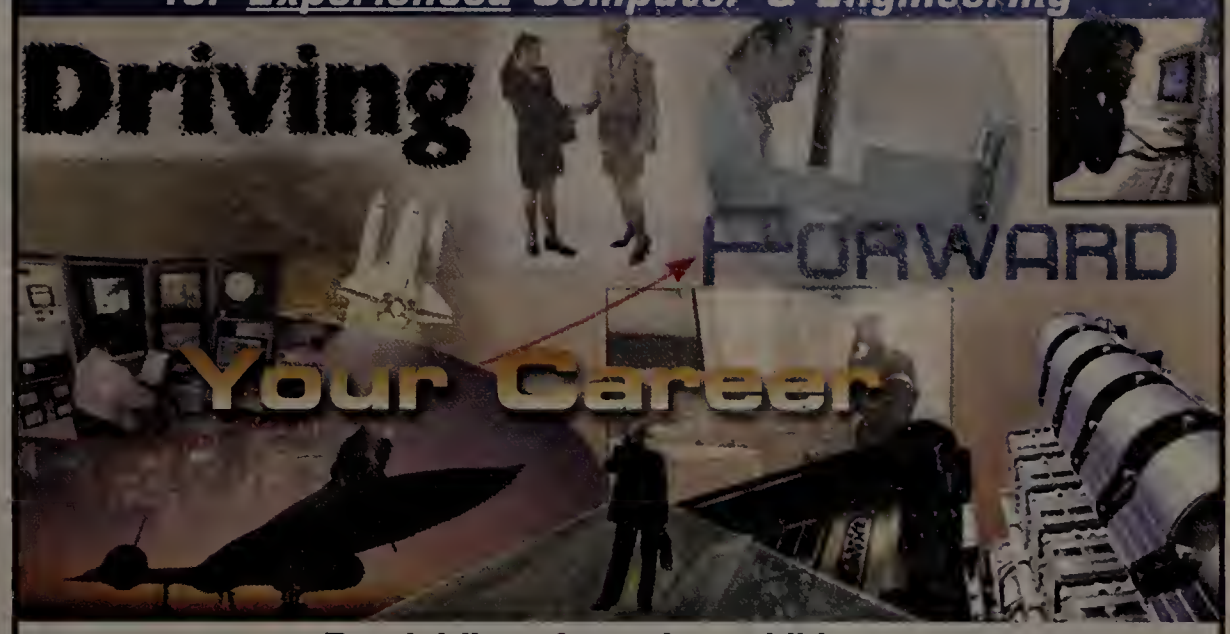

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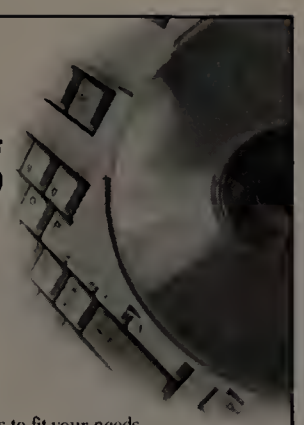

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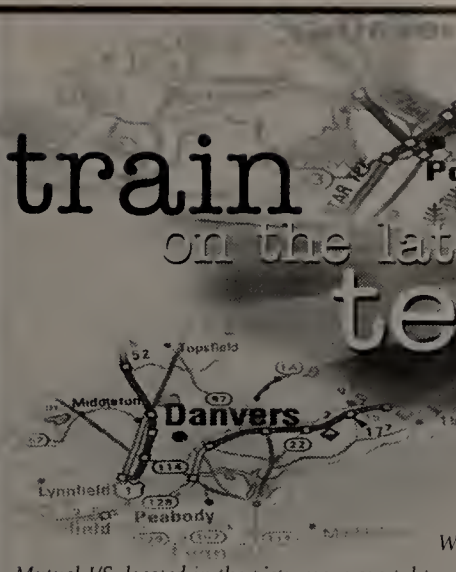

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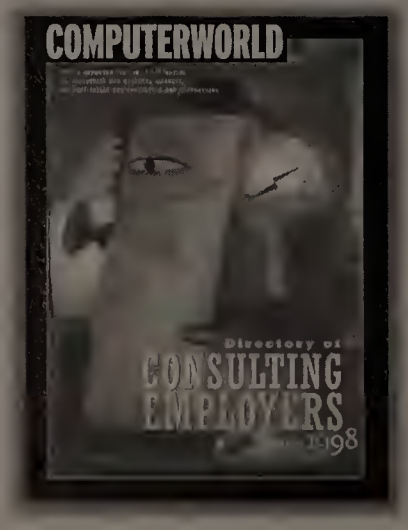

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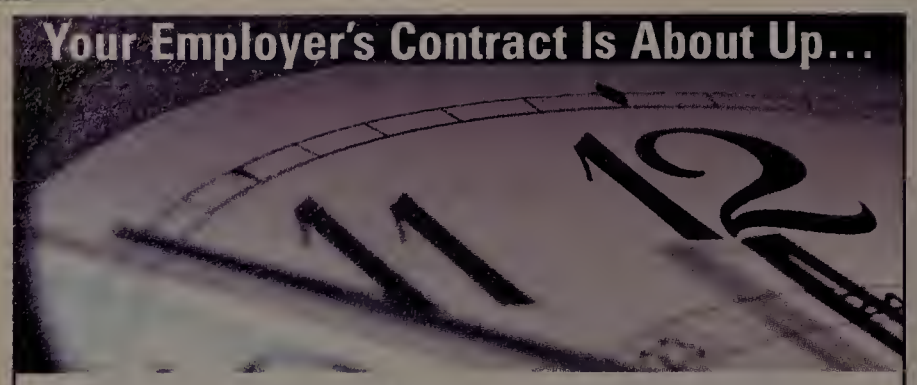

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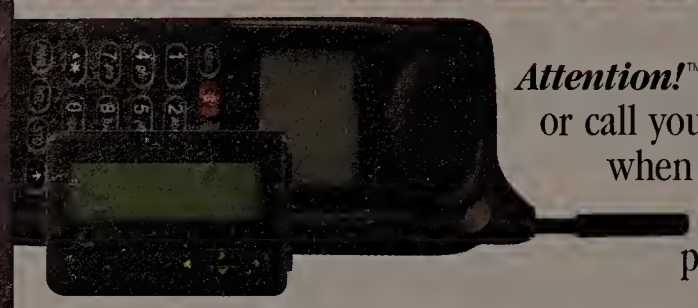

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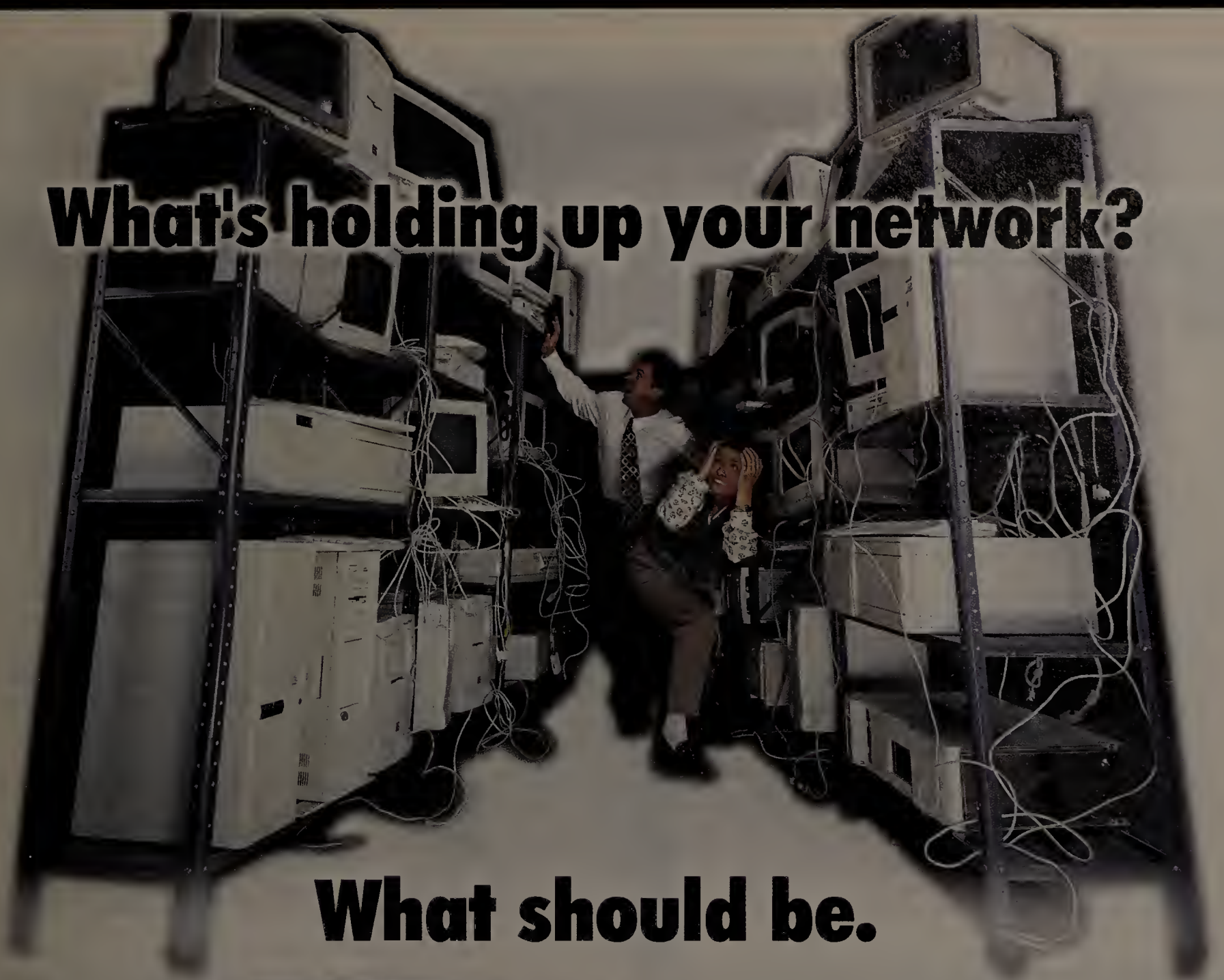

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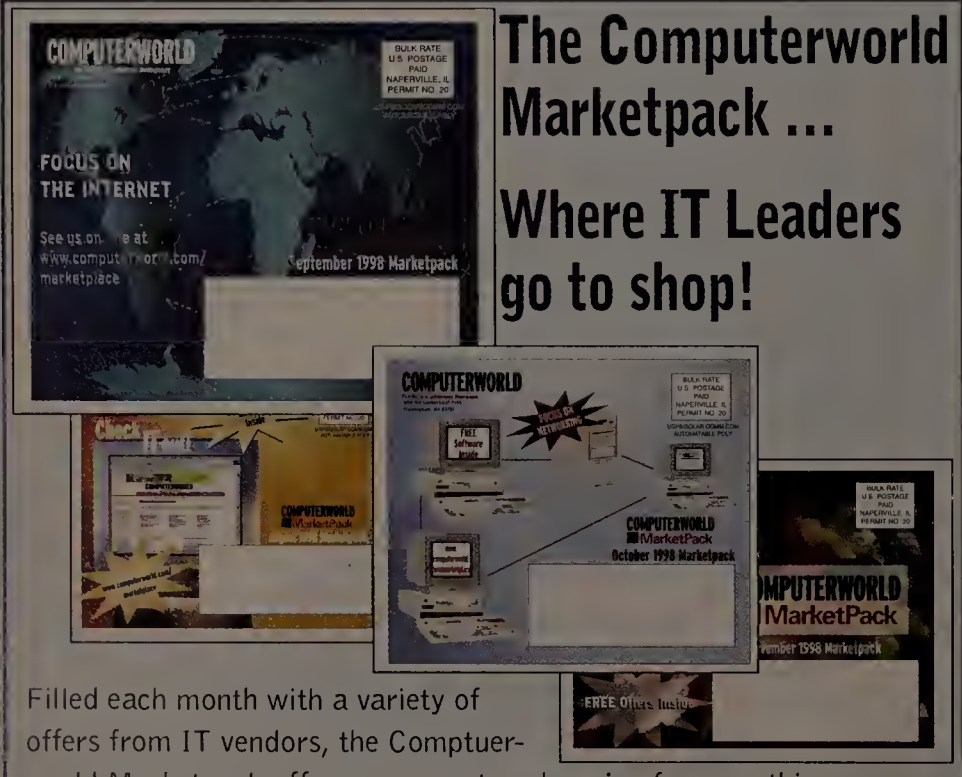

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The Back Page

alt.cw

Dispatches & images from the fringes of the electronic frontier

THE HIGH-TECH BUS STOP

People waiting for a bus usually have no idea whether it's running on time – or even whether they've missed it entirely. But riders in Bellevue, Wash., can see real-time bus arrival information on monitors like those in airports. All 1,300 city buses have vehicle-location devices that feed the Transit Watch system, which is part of the Puget Sound area's Smart Trek intelligent transportation project. The Boeing Co., which is a major employer in the area, is installing three Transit Watch monitors at its Renton, Wash., facilities.

Greatest hits

Some alt.cw favorites from 1998:

Tom Friddell, a self-professed math geek, has uncovered the secrets to winning the Monopoly board game. Friddell used MathSoft Inc.'s Mathcad software to figure out the probability of landing on each of the Monopoly squares. For example, the most frequently landed-on property is Illinois Avenue, making it extremely profitable to own.

Once your mouse glides on this surface, it will never go back to that old rubber pad again. FiberLok Inc. has applied its fiber-coating technology to make mouse pads look and feel like hand-woven Persian rugs. MouseRugs can be ordered from *www.mouserug.com* for $19.95.

NCR Corp.'s Knowledge Lab in London has developed the Microwave Bank, a microwave oven that can be used to pay bills, transfer money, surf the Web and get E-mail. The Internet appliance has a touch screen and voice-recognition software.

Push-button control for speed surfers

Is that old mouse slowing you down? Kensington Technology Group in San Mateo, Calif., offers the WebRacer input device ($59.99) for faster navigation of Web pages. It features a touch pad, navigational buttons and six preset buttons for favorite sites (much like a car radio).

THE FIFTH WAVE *by Rich Tennant*

"We're not sure what it is. Rob cobbled it together from paper clips and stuff in the mail room, but MAN wait till you see how scalable it is."

E-Mail Rich Tennant at the5wave@tiac.net

Inside Lines

Ring in the 'leap seconds'

You might not have noticed, but we all got a bit of extra time to deal with our year 2000 issues. The National Institute of Standards and Technologies says a "leap second" was added to the world's atomic clocks on Dec. 31, 1998, "to keep our clocks synchronized to the spin of the Earth." Such seconds are added from time to time so that coordinated universal time more precisely matches the Earth's rotation.

How the Grinch didn't steal Christmas

Half of J. M. Smucker's IT staff had to give up Thanksgiving weekend to get Oracle's consumer packaged goods applications running on Dec. 1. But there was an even larger goal that kept the workers going. "We were trying to save Christmas," said Dick Jirsa, vice president of information services. And they did it. The jelly maker planned to get by with a skeleton IT crew in late December, although everybody was carrying pagers . . . just in case.

ROI? What ROI?

The folks in The Dow Chemical Co.'s intellectual asset management group know how to keep things light. As keepers of the company's intellectual assets (such as patents), their efforts fall under the buzzword-compliant category of knowledge management (KM). The problem with KM is that it doesn't lend itself to traditional return-on-investment analysis. But at Dow, members of the KM group are so confident about improving the bottom line that they proudly sport "Show Me the Money" T-shirts.

Will you look at this!

If you thought getting a larger computer monitor would be better for your eyes, think again. Larger monitors actually put more stress on eyes, says optometrist Stuart Lazarus of Latham, N.Y. That's because as we look up from our keyboard or desktop, our eye muscles have to work harder to hold our gaze on the more-elevated desktop giants. The muscle strain is less severe when using a laptop monitor because the screen is closer to the keyboard, the eye doc says.

Just one more click-through, darling . . .

Rock star David Bowie is an avid Internet user who once fought off a Net addiction. In an interview with *Computerworld* in this week's The Next Decade supplement, he 'fessed up that his supermodel wife, Iman, reined him in before his monitor tan got any deeper. "If you want to maintain a relationship, never start work on the computer after 7 at night," Bowie says. "You come to bed at 2 a.m., and your partner is not pleased. I nearly got the 'something has to go' talk."

Sun spam fries customer

Sun CEO Scott McNealy was on the CC'ed chain of E-mail complaints about spam that a New Hampshire-based freelance software consultant sent to the vendor. Dave English signed up for Sun's Solutions CD last summer and then last month got what he considered spam from third-party vendors featured on the disc. "How can you post and boast a privacy policy and then not implement it?" English asked incredulously. After many E-mails back and forth, Sun explained that the CD subscription program began in 1993 — long before it started protecting customers from unwanted production information. This month, Sun will send a mailer to all CD subscribers and give them the privacy option.

In a clear demonstration of why software engineers shouldn't enter the writing business, here's the first line from a description of a technology Microsoft got patented last month: "A method for flipping an image in a window using overlays involves creating an overlay flipping structure and using this structure to control 'flipping' of an overlay image in a display device that supports overlays." Uh, stick to software, Microsoft. But if you have something coherent to say, flip it to news editor Patricia Keefe at patricia_keefe@cw.com, or call (508) 820-8183.

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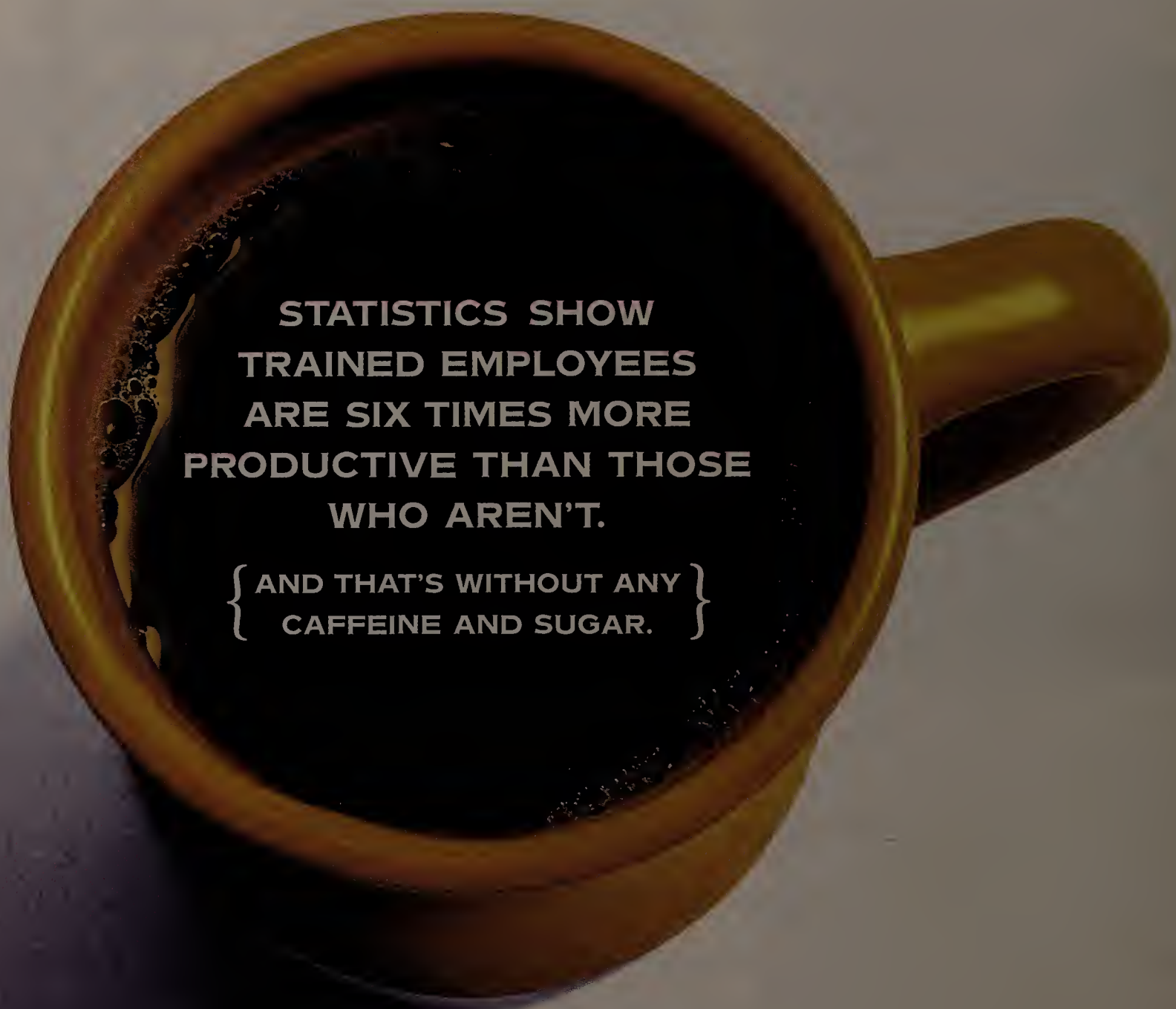

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